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THESIS

**INTRANET PROTOTYPE FOR
THE UNITED STATES COAST GUARD
ELECTRONIC SYSTEMS SUPPORT UNIT ALAMEDA**

by

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September 1998

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The objective of this thesis is to explore uses of Internet technologies and business model enhancements for Electronic Systems Support Unit (ESU) Alameda, a small Coast Guard command. To accomplish this task, this thesis will introduce the concept of Intranet technology, portray the efforts required to create an Intranet, and then discuss the benefits associated with Intranet use.

The thesis introduces two popular design methodologies, analyzes the advantages and disadvantages of each, and determines the best Intranet design methodology for this project by analyzing the needs and abilities of the organization. In addition, it describes the gathering of system and user requirements, data types, processes performed, business model evaluations, and conceptual Intranet development.

The work comprised within this thesis will enable coding and implementation of the Intranet by another thesis team working jointly on this project. While this thesis covers details of analysis and specification development, the thesis of the other team will continue discussion by addressing software coding, security, and maintenance.

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INTRANET PROTOTYPE FOR THE UNITED STATES COAST GUARD ELECTRONIC SYSTEMS SUPPORT UNIT ALAMEDA

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY MANAGEMENT

ABSTRACT

The objective of this thesis is to explore uses of Internet technologies and business model enhancements for Electronic Systems Support Unit (ESU) Alameda, a small Coast Guard command. To accomplish this task, this thesis will introduce the concept of Intranet technology, portray the efforts required to create an Intranet, and then discuss the benefits associated with Intranet use.

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I. INTRODUCTION

A. OBJECTIVE

This thesis describes the prototype intranet specification development for a Coast Guard support command located at Alameda California. The purpose of the prototype intranet development project is to design an effective business model which will enable a collaborative environment and enhance the use of limited personnel resources.

B. BACKGROUND

Managing the proper maintenance and support of all electronics, telecommunications, and computer resources aboard all Coast Guard units located within the boundaries of the Eleventh Coast Guard District[1] is not a trivial task for Electronic Systems Support Unit (ESU) Alameda, a small organization.

Compounding these challenges, ESU Alameda[2] recently experienced two major renovations that may alter their business model and existing culture:

1. The Coast Guard used downsizing and streamlining to meet the budgetary reductions required by federal agencies. Since the Coast Guard could not reduce the public services provided, several of the Coast Guard units which previously supported electronics equipment were cut and ESU Alameda was tasked with covering the additional

---

[1] The geographic boundaries of the Eleventh Coast Guard District refers to all Coast Guard resources within the state of California, and any military vessels requesting assistance in California waters.

[2] The Coast Guard uses four Electronic Systems Support Units (ESUs) on the west coast. All are similar and are referred to by their acronym (ESU), followed by their location. (i.e. ESU Alameda).

workloads.: As a result, ESU Alameda absorbed a small percentage of the previous resources and a complete organizational restructuring occurred.

2. The command completed a phased workstation migration from a legacy proprietary computer environment to a new Windows NT networked platform. Although this presents an enormous learning curve for ESU Alameda employees, it offers the command enormous opportunities to enhance the existing business model and culture of the command. Despite the continuous improvements in commercial office automation, the prior use of proprietary computers required the generation of all forms and reports to be performed manually and offered little to no collaboration between employees other than the use of email. As a result, the time spent performing routine administrative tasks such as personnel issues, the ordering and tracking of repair parts, and the sharing of information required extensive use of scarce personnel resources.

C. PERSONNEL AND SUPPLY TRACKING DATABASE SYSTEMS

These two databases were specifically designed to reduce the command's intensive time spent manually tracking both administrative and supply status issues. Working conjointly with the intranet they will help free up the available time of critical command billets currently over tasked as a result of the downsizing and streamlining initiatives.

Microsoft Access 97 was used to build the system under a rapid prototype methodology. The intranet functionality will then be coded by another thesis student with the use of the Microsoft Internet Information Server (IIS) and active server scripting.

D. CHAPTER DESCRIPTIONS

This section provides an outline of the different parts of this thesis.

1. Chapter I Introduction

This chapter provides a brief description of the business challenges facing Coast Guard Electronic Systems Support Unit (ESU) Alameda. The section concludes with a thesis content description.

2. Chapter II Introduction To Intranets

This chapter gives a foundation of intranet technologies and discusses how intranets are being used to solve business challenges.

3. Chapter III Understanding The Client's Business Environment

This chapter discusses the history, organization, and structure of ESU Alameda and addresses new business requirements recently placed on the command as a result of Coast Guard restructuring (Streamlining). It addresses the current mission, goals, critical success factors and processes.

4. Chapter IV Business Model Analysis & Design Plan Methodology

Chapter four discusses the methodologies used to define ESU Alameda's business model and explains how the critical processes and requirements were defined for use in prototype development.

5. Chapter V Candidate Applications For Business Solutions

Chapter five evaluates how different intranet applications could enhance ESU Alameda's mission effectiveness. Several types of applications which would significantly enhance the business processes of the command will be presented and conceptually explained. Although few of the applications mentioned in this chapter will be part of the specifications development for this project, this chapter offers ESU Alameda potential applications to consider for future development efforts. Mission urgency and customer requests will dictate those used in the prototype development and analyzed in proceeding chapters.

6. Chapter VI Analysis Of Client's Business Processes

After the interviews with ESU Alameda were complete, the data was analyzed to reveal possible ways the business model could be enhanced. This chapter discusses the methodology used to define the new business model and explains the use of data flow diagrams in performing this task.

7. Chapter VII Rapid Prototype Design

Chapter seven discusses the rapid prototype design of the intranet. The use of iterative database designs enabled a development that met the customer's needs. Several screen shots are included to enable the reader to understand the uses of the database in the prototype development effort.

8. Chapter VIII Conclusion

The final chapter briefly describes the need for ESU Alameda to establish a business policy for intranet use, and plan for organizational learning to get the most out of an intranet system. Although intranet security is not the focus of this thesis, a brief security overview and recommendations are provided. Finally, as a conclusion to this thesis, lessons learned are provided for future development considerations.

II. INTRODUCTION TO INTRANETS

A. INTRODUCTION

Chapter two will provide a working background of an intranet system and will begin by revealing a key reason why an intranet should be considered. This chapter will define the scope of the intranet and will show evidence of its rapid growth within the commercial sector. In addition, a listing of organizational benefits will be presented. The chapter continues by examining the various technical parts that contribute to intranet development, including a description of the intranet structure, uses of web servers and browsers, the client server model, and intranet hardware and software requirements. Finally, a section of this chapter is dedicated to the use of the Production and Consumption Cycle to reveal possible ways a typical organization could gather, analyze, and share information by using an intranet.

B. A TYPICAL REASON FOR AN INTRANET

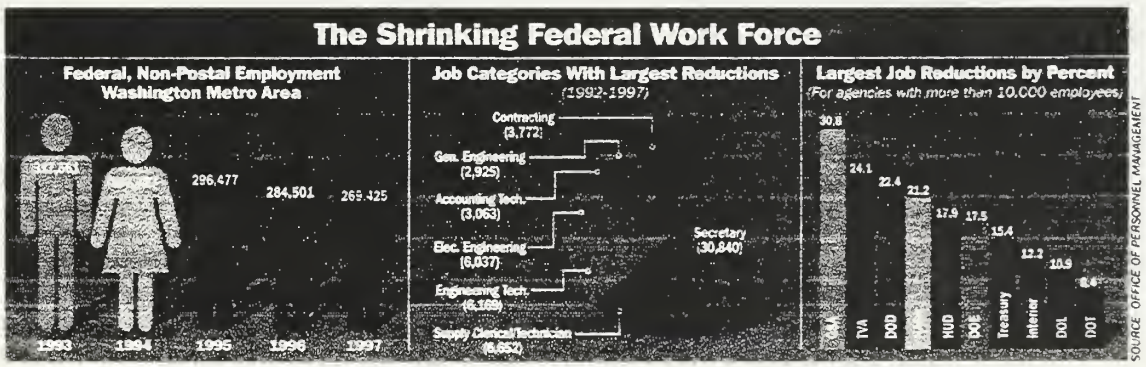

Figure 2.1 The Shrinking Federal Work Force, Ref. [1]

The United States government is reinventing the way it operates in attempts to balance the budget and reduce the federal deficit. To accomplish this task, the work force

has been reduced as illustrated in Figure 2.1. This reduction in force strength means the remaining workers will now have an increased workload and must develop strategies for coping with additional tasking. An Intranet may be the solution to this cultural challenge.

> With the right corporate culture, intranets can become living, growing, organic ecosystems. They promote learning and spawn the innovation that allows organizations to do things cheaper, faster, and better [Ref. 2, p. xiii].

Use of the intranet is not a new concept and has already been proven in the commercial industry. The federal agencies which choose to use this technology now, will be using a proven system to conduct business.

> ...the use of intranets in the enterprise will grow 110 percent this year. ...75 percent of all Fortune 1000 organizations will be running intranets by the end of 1998. ...more than 80 percent of Fortune 500 companies already have some kind of intranet in place [Ref. 3, p. 80].

C. INTRANETS VERSUS INTERNETS

The internet and intranet are very similar to each other with both using the same type of technology. The main difference between the two is the amount of privacy they offer. The internet is a public system while the intranet is a small-scale private version of the internet within an organization. This private version gives you a means to collaborate with other intranet clients using web browsers to instantly deliver information anywhere in your corporate network. Specifically, the intranet offers a highly interoperable, portable cross-platform system that is extremely scalable to the expanding functionality of an organization. Both types of systems use a Transmission Control Protocol and Internet Protocol known as TCP/IP. This TCP/IP protocol is used to carry packets of data over a network of computers. The internet and intranet technology also uses World Wide Web

(WWW) tools such as Hypertext Markup Language (HTML), Common Gateway Interface (CGI) scripting languages, and Java and Active X programming languages.

> All applications designed for the Internet also run on the Intranet. From the applications standpoint, there is no real difference between these two types of networks. Typical Internet/Intranet applications include web, e-mail, newsgroups, and file transfer (FTP) [Ref. 4].

D. GROWTH OF INTRANETS

The tools and capabilities that made the internet such a huge success are now letting thousands of companies share information inside their own organization. The growth of the internet and intranet is spectacular. The graph in Figure 2-2 is a single graph which includes everything related to the intranet including such things as growth in domain numbers, users, and access providers. The x-axis lists the years from 1990 to 1995 and estimates for 1996 to 1998. The y-axis reveals the amount of growth.

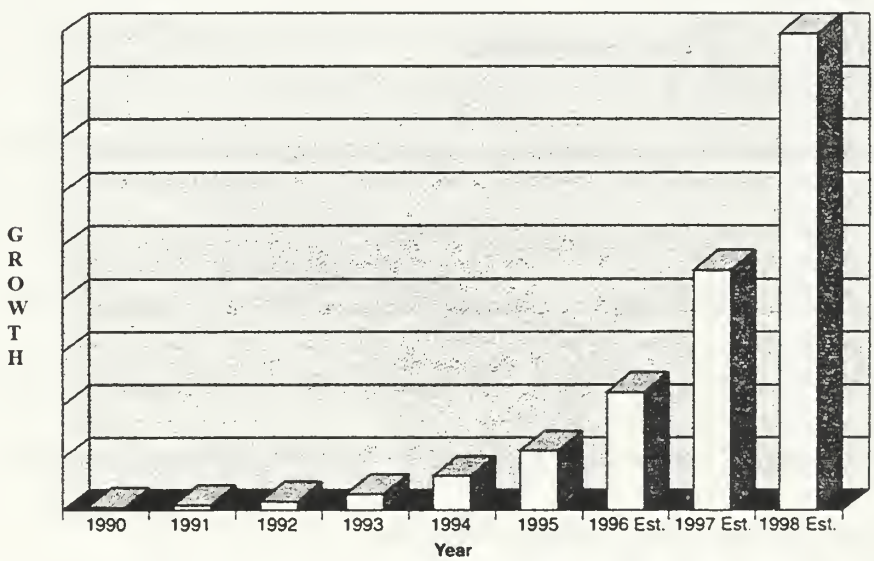

Figure 2.2 Growth Of The Internet, [Ref. 2, p. 7]

> Ian Campbell, Director of Collaborative Technologies for International Data Corporation (IDC), estimates that there were 100,000 intranet web servers in 1995, and that this number will grow to 4.7 million by the year 2000. He also said that there were approximately 10 million Web browsers in use in 1995, and he estimates that number will be 40 million in 1996 and 180 million in the year 2000. By any yardstick, that is phenomenal growth [Ref. 2, p. 8].

There are several different classifications of intranets with each being specified by the function of their use.

> The Gartner Group classifies intranet proliferation and development into three levels. Level 1 intranets consist of low-level implementations, static publishing , or simply moving content on-line. Level II intranet development centers around enabling core day-to-day applications for web use and using the intranet as a workgroup computing platform. Level III intranets will be characterized by a large base of web-enabled applications, a consolidation of dozens of Application Program Interfaces (API's) used in Level II, more secure web servers, and more powerful development tools. Most companies spent 1996 testing intranet waters at level I. Mainstream organizations are expected to develop Level II intranets in 1997 and 1998. By 1999, top organizations are expected to plateau at Level III [Ref. 3, p. 80-81].

E. USES OF INTRANETS

Once the intranet is established in a corporation the uses are almost endless and are largely dictated by the imagination of the designer and administrator. Many of the roles the intranet plays are very simple, requiring simple web pages created using HTML. Others can become extremely complex and sophisticated requiring special programming and links to developed databases. Figure 2.3 gives a graphical breakdown of ways corporations are currently using intranet technology.

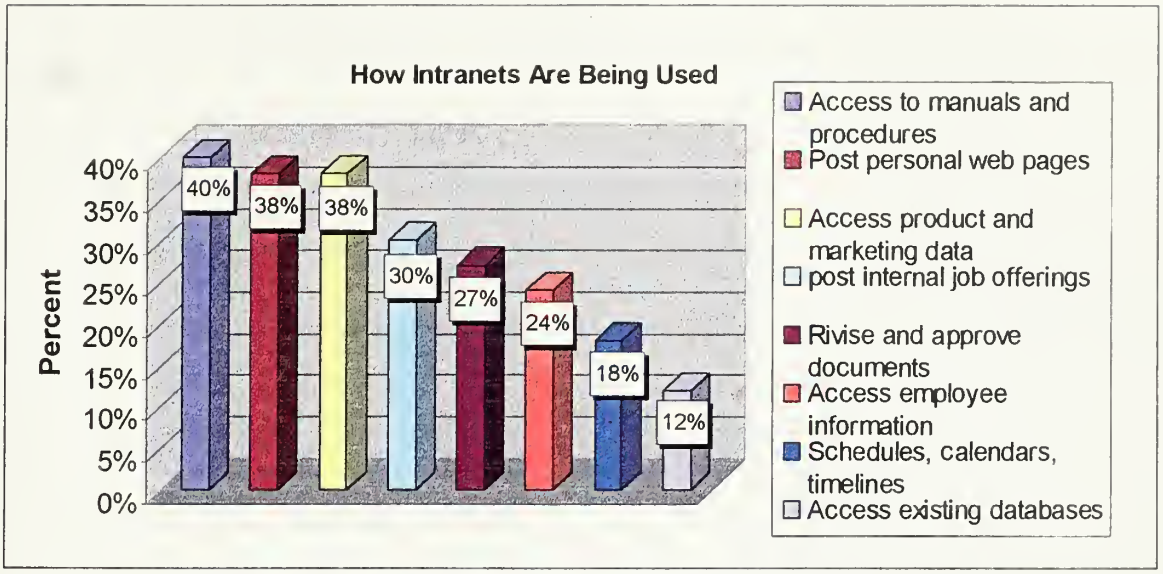

Figure 2.3 How Intranets Are Being Used, [Ref. 5, p. 15]

Here are a few examples of what may be found on a typical intranet [Ref. 2, pp. 8-9].

- Electronic Mail
- Directories
- Organization charts
- Memos
- Personnel manuals
- Benefits information
- Newsletters and publications
- Systems user documentation
- Training
- Newsgroups
- New extracts
- Job postings
- Sales reports
- Financial reports
- Customer information
- Quality statistics
- Vendor information
- Product information
- Marketing brochures, videos, presentations
- Product development information and drawings
- Inventory information
- Network management
- Asset management
- Supply and component catalogs

F. THE ADVANTAGES OF INTRANETS

There are numerous reasons an organization may want to set up an intranet. Here are just a few of the possible reasons:

1. Tangible benefits of intranets [Ref. 2, p. 29]

- Fast and easy to implement
- Cheap to implement
- Easy to use
- Save Time
- Provide operational efficiency
- Save cost
- Based on open standards
- Connect and communicate among disparate platforms
- Put users in control of their data
- Secure
- Scalable
- Flexible
- Provide the richness of multimedia
- Leverage your infrastructure and applications investment

2. Intangible benefits of intranets [Ref. 2, pp. 29-30]

- Provide better communication
- Provide access to accurate information
- Capture and share knowledge and expertise
- Provide better coordination and collaboration
- Provide for creativity and innovation
- Provide new business opportunities
- Provide new business partnerships through access by suppliers and customers

Intranets are relatively inexpensive to install and administer compared to other forms of group collaboration techniques such as long distance phone calls, teleconferencing, meetings, and some GroupWare products. Web browsers are available from several sources either for free or for a modest price, and many of the web servers

required are packaged with operating systems which may already be in place. An example of such an operating system is Microsoft's Windows NT Server. Whereas many GroupWare products (unlike the intranet) are not fully interoperable and requires specific hardware, operating system, and network configuration [Ref. 6]. A new study conducted by U.S. Computer and funded by Sun's Internet Commerce Group indicates that web technologies can reduce internal corporate networking costs by as much as $11 million over four years for a large network [Ref. 7].

The intranet operates on an open platform meaning that it acts as its own layer, independent of the operating system. There is no need to change the existing hardware or operating system already in place. If it is a standard system, then there will most likely be a browser available for it, making it intranet capable.

> The one hidden expense of setting up a corporate intranet is that you must run TCP/IP (transmission control protocol/Internet Protocol), the protocols that define how information is passed around the internet, on your network. If your organization runs on TCP/IP now, then you've paid the price for more memory and new software in desktop PCs and more capable routers throughout the network [Ref. 8, p. 107].

G. INTRANET COMPONENTS

Each organization will set up an intranet differently. Some will consider the inside use of the web along, along with any specific web based applications, as their intranet. While others will also consider the actual computer network of the organization as part of the network. Here are some of the most common components of an intranet: [Ref. 2, pp. 9-10]

- Network
- Electronic Mail
- Internal web
- Newsgroups
- Chat
- FTP
- Gopher
- Telnet

1. Network

> The first, and most complicated, part of any intranet is the network. The intranet is the network of many networks. In large organizations, the intranet may also be a network of networks. In smaller organizations, it may be just a singe network. At any rate, the network is at the heart of the intranet. The intranet can't exist without it [Ref. 2, p. 10].

Organizations can use a variety of different technologies the link their computers together to form networks. The main design factors would consider such things as funding requirements, distances between computers, use of existing computer hardware, and the amount of security an organization requires. A simple type of network is a Local Area Network (LAN). A LAN serves only a single group of users within the same physical space. Examples of a LAN would be a military command inside the same building, or a department within an organization. As previously mentioned, LANs can be made up of varying types of technologies. Ethernet, Token Ring, and Fiber Distributed Data Interface (FDDI) are among the most common. A description of each follows:

Network Types

- Ethernet. Ethernet LANs consist of coaxial cables or twisted-pair (standard telephone) wire hooked to a device called a *hub*. The hub is the traffic cop that directs traffic along the network

- Token Ring. Token Ring LANs consists of coaxial cables or twisted-pair wires attached into a Media Attachment Unit (MAU). The MAU simulates all devices being connected into a ring. Computers on the ring take turns transmitting. A token passes sequentially to each device on the ring to indicate when it is their turn to transmit.

- FDDI. FDDI networks are similar to Token Ring Networks in that they also pass a token. However, they use fiber-optic cable instead of twisted-pair wires [Ref. 2, p. 10].

2. Electronic Mail

Electronic Mail, otherwise referred to as e-mail, allows one person to compose a message and send it electronically to anyone in the world who has an e-mail address established. The receiver can also respond just as easily. With the improving of email software programs, email is no longer limited to just text files. Users can now send formatted documents, presentations, sound files, and video clips just as easily as a text document.

By default, e-mail is generally an organizations first intranet application. It provides the opportunity to communicate from one person to another or to many people [Ref. 2, p. 11].

3. Internal Web

When people think about internets they are usually thinking about internal webs, however, the internal web is not synonymous with an intranet. It is only a part of it, but it is a very important part. Just like the use of e-mail and web browsers have caused the internet to explode, they have done the same for the intranet.

> The internal web is simply using Web tools inside your organization. It makes your corporate information easy to access. All users have to know is how to use a mouse to point and click. If they can do that, then any information they need can be available at their fingertips. With the addition of search tools to the internal web, if they can use a keyboard, the possibilities become almost endless [Ref. 2, p. 12].

The use of the internal web will allow different divisions of an organization, or different teams within a division to collaborate and share information. This works differently than a typical network. For instance, a maintenance team may require logistics information from an unavailable supply division. Under a network system they would have to know exactly where the information was stored, and then possess the exact application required to view the data at their computer. Under an intranet, a search for a key word could be performed to find the needed file, and then that file viewed. This is because the internal web is not application dependant. This example of course assumes the security of the file allows access.

The internal web consist of two major components.

1. Web Server
2. Web Browser

a. Web Server

The web servers act as the hub for the entire intranet. They are computers which store all the web pages and use the Hypertext Transfer Protocol (HTTP) to send the needed page to a web browser (or client) when requested.

b. Web Browser

The primary function of the web browser is to act as a graphical user interface (GUI) between the user and the web server. For this reason, the web browser is also referred to as a client of the web server. More on this type of relationship will be explained later in this chapter. The browser portion of the internal web is physically

located on the user's computer. The user uses the browser to request pages from the web server and download Hypertext Markup Language (HTML) documents. As web browsers have become more robust in their operation, they have mirrored themselves to work with other internet software tools within the same browser program. Examples of other internet related functions include e-mail, newsgroups, and File Transfer Protocol (FTP). The browser is a critical part of the intranet because it enables a common interface between all users and their shared information. With a browser on every computer, users are no longer required to have the same applications as a different department to view data files. The savings in software purchasing alone could become enormous as long as the original data is saved in the HTML format.

4. Newsgroups

Using a newsgroup with a web browser is similar to using email. The difference being that the information is published so everyone accessing the newsgroup can read the ongoing content instead of just a selected few. This form of communications also reduces the congestion of hardware resources since a user checks a newsgroup instead of everyone being sent the same email. This type of collaboration enables threaded discussion (continued discussions) where different people can ask questions or discuss topics of common interests. It also allows archiving of discussions where search mechanisms can be used to seek out answers to previously answered questions. Acting in a sense as a knowledge base for corporate information.

5. Chat

Internet Relay Chat (IRC) facilitates conversations over the internet in close to real time. On an intranet, chats can take the place of long-distance phone calls between locations. They allow you to communicate ideas more quickly than through e-mail. Chats facilitate brainstorming sessions for participants who can convene at the same time, but not at the same place. You can schedule a chat about any topic of common interest and anyone can participate. You can also use chat for impromptu conversations [Ref. 2, p. 19].

6. FTP

File transfer protocol (FTP) provides you a repository of information that is readily accessible. Anyone with FTP can log in to the repository and download what they need to their computer. FTP works well for transferring files that are too large to send by e-mail [Ref. 2, pp. 19-20].

A few ways FTP can be used on an intranet are:

- Allow users to download software and patches
- Allow web pages to be uploaded to servers
- Permit file transfers of very large files such as drawings, project drawings and specifications and computer aided design files

7. Gopher

Like much of the internet, gopher provides text-only information. Gopher is menu-driven, making it easy for you to drill down through levels of menus to get to the information you need. Before the advent of the Web, gopher servers provided the richest repositories of information on the internet [Ref. 2, p. 20].

Just like FTP applications are now part of the typical browser, gopher applications have also joined the browser role. To a large extent, the web has replaced the typical gopher servers previously used, but there may still be archived

information on gopher servers that could benefit an organizations intranet design. If an organization needs access to these large collections of government and university gopher servers or if the organization already is using a gopher server, then a gopher server is probably not needed on the modern intranet.

8. Telnet

Telnet allows you to log in to a remote computer. It typically provides access to resources that reside on remote mainframes. Telnet (TN) 3270 allows you to access a mainframe and emulate a 3270 host-based terminal. A major use for TN3270 is to provide access to university library card catalogs and databases. You can use it to open up your mainframe applications to your intranet; however, it's not as pretty as using the Web [Ref. 2, p. 20].

H. INTRANET TECHNOLOGIES

1. The Client/Server Model

To understand how the internet and intranet operates, it is important to understand the concept of client/server computing. The client server model as shown in Figure 2.4 is a form of distributed computing where one application (the client) communicates with another application (the server) for the purpose of exchanging information. Specifically the client and server perform the following functions [Ref. 9]:

a. The client's responsibility is usually to:

- Handle the user interface.
- Translate the user's request into the desired protocol.
- Sends the user request to the server.
- Waits for the server's response.
- Translate the response into "human-readable" results.

- Present the results to the user.

b. The server's functions include:

- Listen for a client's query.
- Process that query.
- Return the results back to the client.

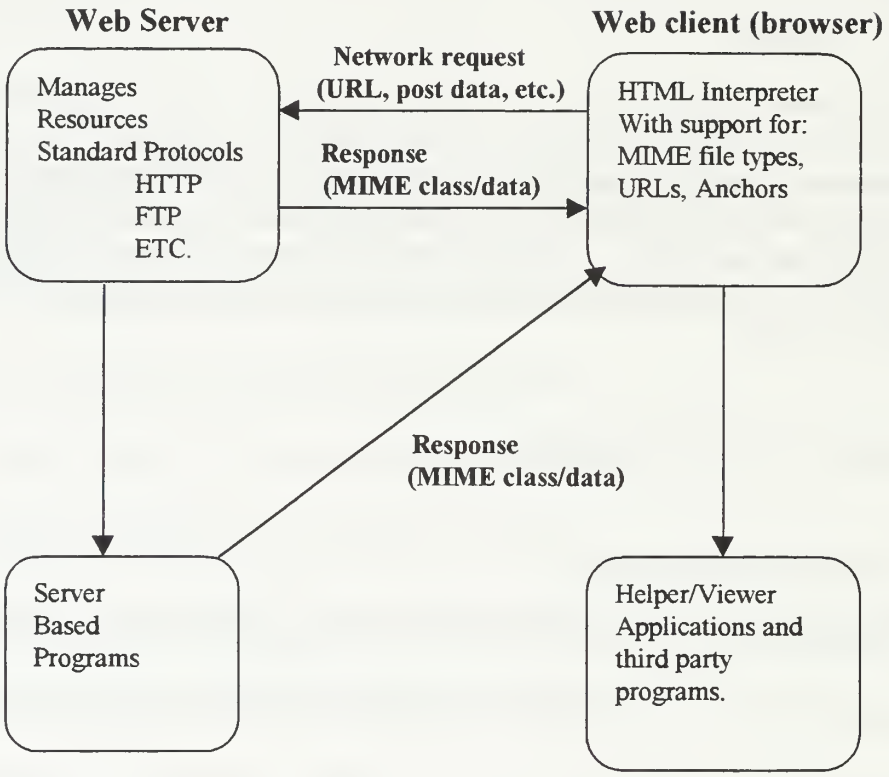

Figure 2.4 Client Server Dialog [Ref. 10, p. 8]

Referencing Figure 2.4 for this example, a person uses the browser as their primary interface to interact with the application they desire. In this case, a user will run client software to create a query. The client then connects to the server in a method transparent to the user. The browser uses interpreters to interact with the internet/intranet resources to access the information desired by the user. Both sides use URLs to describe the

protocols and locations of web resources without regard to the particular client software the user is employing to access them [Ref. 11]. Using standard protocols the client sends the query to the server where the server analyzes it, computes the results of the query and then sends the results back to the client using established internet protocols. The server may also use other sever based programs to obtain the results, which are then sent to the client is similar fashion. Once received, the client presents the results to the user in the browsers graphical interface. Similar process occurs for many of the other client server interactions.

Key WWW specifications include the Hypertext Markup Language (HTML), Uniform Resource Locators (URLs), Multipurpose Internet Mail Extension (MIME and the Hypertext Transfer Protocol (HTTP) [Ref. 10, pp. 8-9]. These specifications are discussed as follows:

- **Hypertext Markup Language (HTML)** – HTML is used when publishing a document that is to be displayed through the WWW. HTML is a set of simple syntax commands that describes how a document is structured. This language allows the user to define the parts of a document, but not the formatting, so that the browser used for reading the document can format it best to suit the user's display.

- **Uniform Resource Locators (URLs)** – a URL is a complete description of an item, containing the location of the item you want to retrieve. A typical URL looks like this: http://www.nps.navy.mil. the first item in the URL (portion that ends with a colon) is the protocol used to retrieve the item. For this URL the protocol is Hypertext Transfer Protocol. The two forward slashes that follow indicate that what follows is a valid host address. It can either be the text as shown or the actual corresponding IP address of the site.

- **Multipurpose Internet Mail Extension (MIME)** – MIME is an extension to the existing Simple Mail Transport Protocol (SMTP) standards that offer a standardized way to represent and encode a wide

variety of media types, including textual data in non-ASCI character sets, for transmission via internet mail.

- **Hypertext Transfer Protocol (HTTP)** – After it was decided to use hypertext as the standard format for WWW documents, a protocol that allowed these hypertext documents to be retrieved quickly was developed. This protocol is HTTP. HTTP is a fairly simple communication protocol that allows the document it is retrieving to retain hyperlinks to other documents during download [Ref. 12, pp. 117-140].

I. HARDWARE AND SOFTWARE REQUIREMENTS

A computer system operating on an open system TCP/IP network can also run internal applications distributed over a corporate LAN by using an intranet. This is accomplished in a similar fashion that the internet uses web servers and browsers. Because the protocols used within the intranet are optimized for the low-bandwidth modem connections typically found in the internet environment, the intranet does not demand high speeds from any of its hardware components. Even though the intranet web server and browser form the heart of the intranet, it cannot exist without an existing computer network infrastructure in place. This infrastructure will have it's own hardware and software requirements and will largely dictate the amount of CPU, RAM, and Disk Storage resources the system will require. Typical requirements to consider include:

Requirements:

- server machines and client workstations, which can include a mix of platforms (such as versions of Unix, Windows, and Macintosh), applications, and network services, all communicating via the TCP/IP protocol

- network backbone (LAN/WAN), consisting of connections, cables, satellite links, bridges, routers, brouters, repeaters, and other components (Optional) backend databases, which can include a mix of legacy databases, departmental databases, data warehouses, and other data stores

- Standard TCP/IP services, including Hypertext Transport Protocol (HTTP), Domain Name Service (DNS), File Transport Protocol (FTP), GopherS, Usenet news, Wide Area Information Servers (WAIS's), remote login services (Telnet), electronic messaging, and so on, running on server and client machines

- All network resources are configured with IP addresses and communicate with other resources via TCP/IP. The network may be distributed across multiple sites. Information access is controlled via user authentication, firewalls, certificates, the Secure Sockets Layer (SSL), and other mechanisms

- To deploy an intranet, your organization must have a fully operational TCP/IP network installed either throughout the enterprise or in the portion of the LAN/WAN on which you want to run your intranet applications [Ref. 13].

- Web authoring software to create and update site content.

Although the functional design of the network will dictate the majority of the hardware requirements for the intranet, there is a large degree of flexibility in choosing the software applications, servers, browsers, and scripting languages used. The designs of intranets, along with their software requirements, can vary in complexity depending on the design objectives of the intranet. On the simple side, static web pages are posted using easy to use office software such as word processors. On the complex side, information requires large streaming multimedia files, database and application interactions, and use of Common Gateway Interface (CGI) programs to meet desired organizational functionality.

Once the objective of the intranet is established by the organization, the choice of web server must be determined. Since web servers are continually emerging, each must be evaluated on flexibility, cost, and ease of use. Currently, Netscape FastTrack Server is the best bet for a no-frills server. Netscape Enterprise Server and Microsoft Internet Information Server (free with NT 4.0 server) are more industrial strength. They each contain security features, search engines, and ability to interact with databases. A second choice that must be made is the way the intranet web will be developed. Choices include programming in HTML, or use of many WYSIWYG editors that help develop the HTML code such as HotDog, FrontPage, and NetObjects Fusion. If the intranet involves interactions with databases then a Common Gateway Interface (CGI) program will be required for the database and web server to interact with each other. Common CGI programs include Cold Fusion, and Microsoft Active Server Pages [Ref. 14]. Several elements determine which applications are best suited for the intranet design including budget, available time, developer skills, prior experiences, technical support, release dates, and current product reviews.

J. INFORMATION CREATION AND CONSUMPTION

> ...most users on intranets are not "webmasters", but rather business users who need to create and analyze information. Presentation is important but secondary. Their goal is to get their job done [Ref. 15, p. 1].

An intranet offers little value to an organization if the consumption and distribution of data does not support the operational environment. For the most part, organizations access data, collaborate information, publish results and

generate memos, proposals, budgets, analysis, presentations, and supporting documentation.

To take advantage of the new opportunities an intranet can offer an organization it must be willing to allow cultural change of the employees. However, there is a distinct danger that this change could pursue the adaptation of time consuming graphical displays instead of the creative collaboration of ideas if not properly managed. For this reason, adequate training in web publication and standards of content will be required. To maintain organizational unity guidelines can be established, but the enforcement and creativity of intranet use should be decentralized to each division to enhance individual productivity and effectiveness of the intranet. With different operational roles, each division will different ways to use the intranet resources to save time and maximize creativity among peers. Figure 2.5 introduces the information development and consumption cycle which focuses on the concept of developing relevant up to date information.

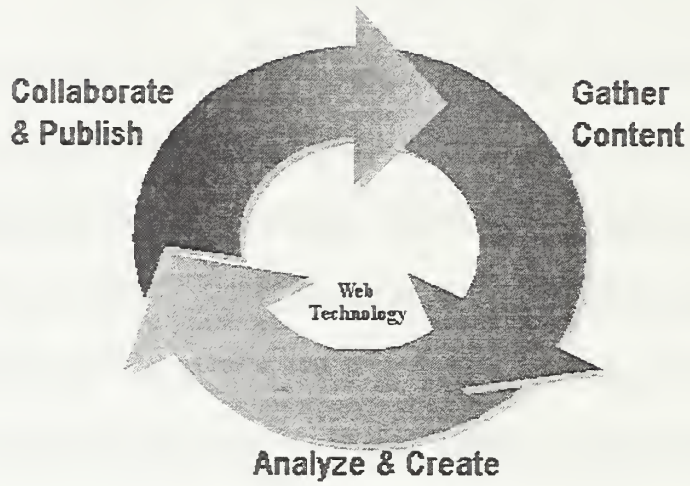

Figure 2.5
Information Production and Consumption Cycle, [Ref. 15, p. 3].

The process starts with an organizational member having a need for information.

> The typical knowledge worker operates in the context of the information creation and consumption process. Their primary product is new information which contributes to the collective corporate knowledge base of information. For example, a knowledge worker gathers information from many sources, perhaps from the Internet, corporate databases or a Word document on the LAN. As this information is collected and analyzed, the user begins to create new content using familiar tools like Microsoft Office. In some this creation process involves several people and content is developed collaboratively. Once this information is distributed others can access it and use it to drive other cycles of information consumption and creation [Ref. 15, p. 3].

The first step in the circular data generation process is to gather up to date and valid content pertaining to specific organizational requirements. Once sufficient content is collected the second stage begins. In the second stage the content is analyzed, clarified, and composed. Web based applications are used to create HTML documents capable of

bringing out the key concepts of the collected data so other members of the group can quickly gain the obtained knowledge base of new information. Finally, the third and final stage occurs where the data is published and collaborated among the various users within the organization to enhance team productivity. The iterative process creates and maintains an organizational knowledge base of relevant and timely data. As organizations develop their intranets they continue to learn and will select the specific publishing technology that best addresses their needs.

K. CONCLUSION

This chapter spanned a wide area of topics including reasons a government organization may consider developing an intranet, a background description of what an intranet is and how rapidly it has grown within the commercial sector. The chapter continued by defining numerous uses of an intranet and then defined several tangible and intangible benefits to using an intranet technology. It looked at the various technical pieces of an intranet and explained their purpose within the intranet structure. The chapter continued providing background material by offering a description of the basic concept of web servers and the use of browser within a distributed client server model, explaining how their functions enable the sharing of intranet resources. Intranet development planning was introduced along with considerations to be made in establishing hardware and software requirements. The chapter concluded by discussing ways a typical organization would gather, analyze, and publish information using the Information Production and Consumption Cycle to improve an organizations knowledge base of up to

date relevant information. The following chapter focuses on the mission of the Coast Guard's Electronics Systems Support Unit (ESU) Alameda, located in Alameda California.

III. THE CUSTOMER

A. INTRODUCTION

The ability to use the concept of database design and internet active server scripting intrinsically motivated two separate thesis teams to work together as a design team and develop a prototype intranet for a receptive organization. The search for such an organization was limited to those willing to share their existing business challenges with the team, and to those who already possessed or would soon possess a technical architecture sufficient for intranet development. Ideally, the organization would be able to specifically identify and be in control of their critical requirements, be under extrinsic motivation to change existing business routines, and be extremely willing to discuss ways their business model could change to improve operational performance.

This chapter focuses on Electronic System Support Unit (ESU) Alameda, which is a small Coast Guard command located in Alameda California. A brief history of the unit is provided, followed by a review of the command's functional organization, and mission objectives. Finally, those forces extrinsically motivating the need for internal change will be introduced along with the command's requests for the team.

B. BACKGROUND

1. Agency Overview

> The Coast Guard is the primary federal agency with maritime authority for the United States. It is a complex organization of ships, aircraft, boats and shore stations. Decentralized, both administratively and operationally, CG personnel respond to tasks in several mission/program areas. A vessel may

> carry out roles in law enforcement, search and rescue, marine environmental protection, maintenance of aids to navigation, and ice breaking. An aircraft may search for and assist distressed vessels, evacuate injured people, conduct pollution detection and surveillance flights, report sightings in conjunction with law enforcement, and carries out the mission of the International Ice Patrol [Ref. 16].

The Coast Guard forms a hierarchical organization which is geographically separated into two (west coast and east coast) similar platforms. Acting within the Commandant's guidelines, the Atlantic Area and Pacific Area Commanders carry out the missions of the Coast Guard by directing each of their respective district admirals. Each of the several district admirals then uses their numerous commanding officers and operational platforms to actually carry out the missions of the Coast Guard. When technical problems arise, operational support is received from the respective Maintenance and Logistics Command (MLC Atlantic or MLC Pacific). To enhance the support capabilities of the single Maintenance and Logistics Command, specialized functional support commands are decentralized and geographically located in each district. Since there are several operational platforms scattered throughout each district, the support commands may further decentralize their technical staffs to increase effectiveness. As previously mentioned, the west coast Maintenance and Logistics Command uses four Electronic Systems Support Units (ESUs) to directly support the Pacific Area (PACAREA) Commander and four district admirals. Each ESU provides a similar role within their respective geographical boundaries and operates under the supervision of the MLCPAC Electronics Systems Division (t). Figure 3.1 provides the Coast Guard's

hierarchical organization down to the Area, District, and MLC levels. The ESU is conceptually part of the MLC unit within this diagram.

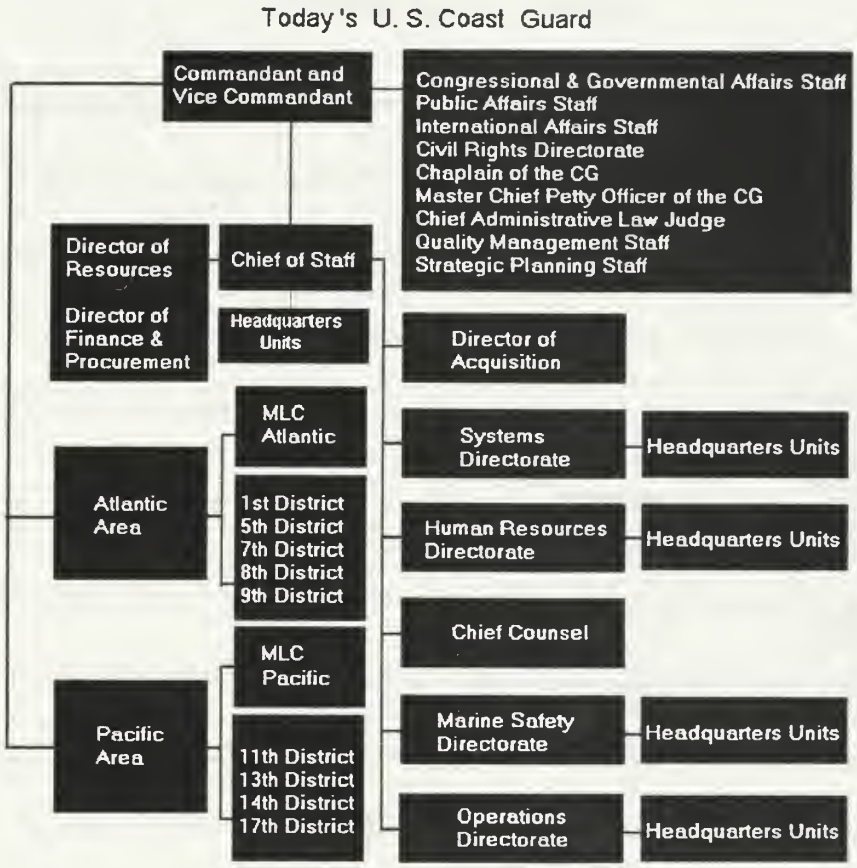

Figure 3.1 Coast Guard Organization, [Ref. 17].

2. Mission

The mission of Electronics Support Unit (ESU) Alameda is to provide complete and timely electronics, telecommunications, and computer related support to any Coast Guard unit operating within the geographical boundaries of the Eleventh Coast Guard District[1] (D11). Figure 3.2 portrays the area of responsibility and gives a good

[1] The boundaries of the Eleventh Coast Guard District encompass the states of California, Nevada, Utah, and Arizona.

visualization of the magnitude of this task and the numbers of organizations supported.

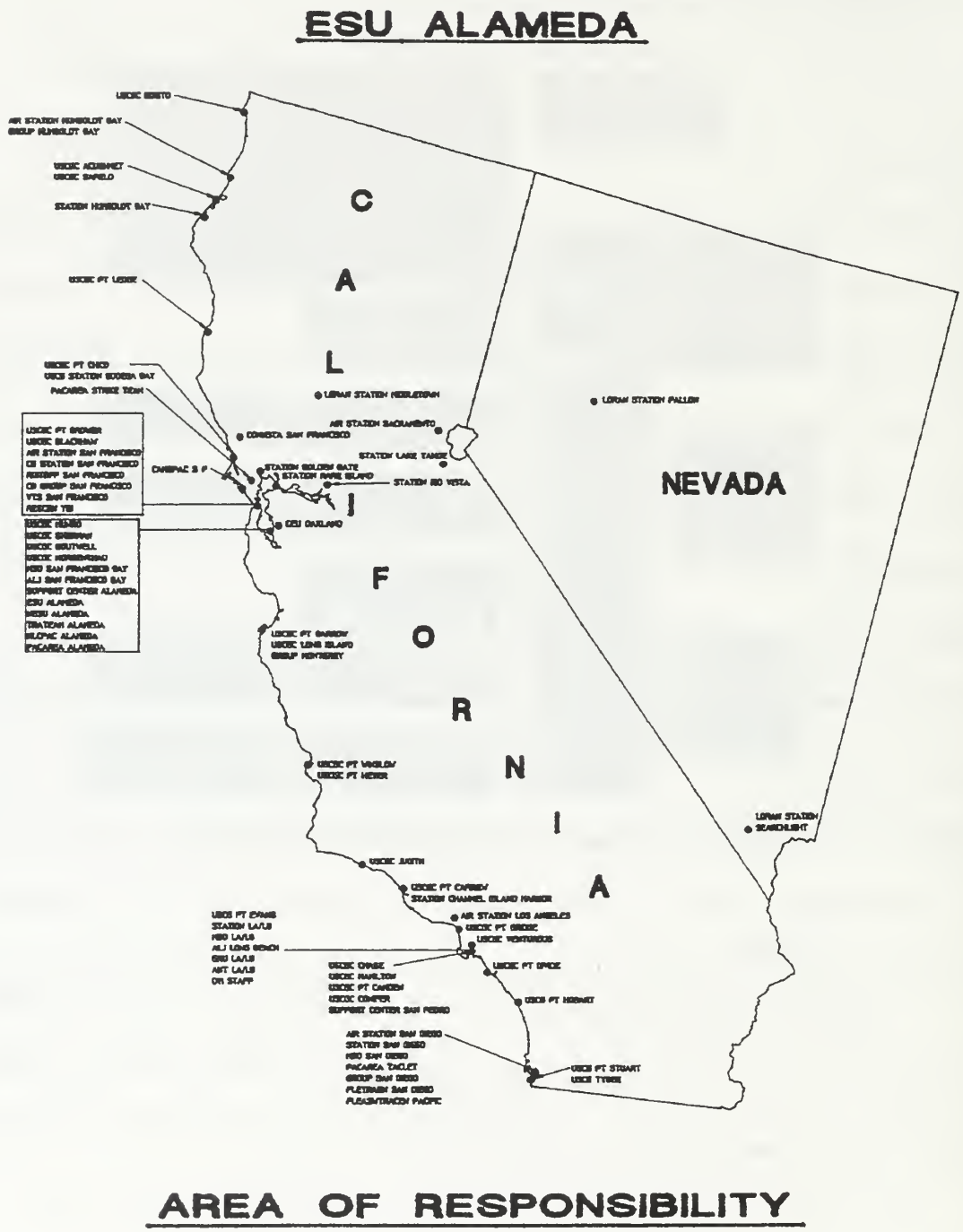

Figure 3.2 ESU Area Of Responsibility, [Ref. 18].

In addition to the units provided in Figure 3.2, ESU Alameda is also responsible for supporting all Coast Guard cutters transiting the waters of the Eleventh Coast Guard District.

The scope of this technical support includes the provisions of timely maintenance, repair, and any form of technical assistance requested from an operational unit including technical advice. These tasks are accomplished by providing the following services under the authority of the Maintenance and Logistics Pacific instructions, specifically MLCPACINST 10550.1 (series):

Contract Support

The Eleventh Coast Guard District (D11) Maintenance Contract is the primary means of providing preventative and corrective electronics maintenance to Groups, Air Stations, Patrol Boats (WPBs) and Stations within D11. ESU Alameda administers and oversees this contract as the Contracting Officer's Technical Representative (COTR). ESU Alameda's Quality Assurance Evaluators (QAE) constantly monitor the quality and performance of the civilian contractor to ensure timely and thorough support is achieved.

Casualty Response

ESU Alameda coordinates all maintenance and logistics actions required to quickly resolve equipment failures published as Electronic Casualty Reports (CASREP) for afloat and ashore units alike. Depending on the type of unit involved, specialized sections within ESU respond to each CASREP by arranging for technical assistance and/or corrective

repairs through a private contractor or other resources. This is ESU Alameda's number one mission priority.

Telecommunications Support

ESU Alameda maintains two telephone (TT) shops: one centrally located on Coast Guard Island in Alameda California which supports all Northern California units, and one in San Pedro California which supports all Southern California units. These two shops maintain all telecommunications systems which are not currently covered by private contract. In addition, these shops are responsible for the Bay Area Communications System, a very large Coast Guard owned microwave system.

Project Assistance

ESU Alameda acts as the liaison between the district staff elements and operational platforms and the Maintenance and Logistics Command electronics section MLCP(t). ESU frequently assists the Maintenance and Logistics Command or district staff in coordination of equipment installations and other project functions.

Pipeliner Staging

ESU Alameda serves as a staging area for Electronic Technicians (ETs) awaiting advanced schools for specific shipboard equipment. This assistance to Coast Guard cutters prepares the new technician to transfer afloat. While awaiting these schools, ESU exposes pipeliners to as many facets of the ET world as possible, including hands-on electronics repair and maintenance training.

As previously mentioned, ESU Alameda primarily performs ongoing electronics maintenance repair and project installations for other governmental commands located within the boundaries of the Eleventh Coast Guard District. Due to the nature of their jobs, ESU Alameda acts as liaisons with many organizations to provide funding, parts, logistics, and technical assistance. In addition, ESU Alameda works with both contracted and military sources as well as government employees both inside and outside of their span of control.

3. Organization

ESU Alameda is functionally and geographically organized to place support technicians and contract shops as close to their customers as possible while maintaining functional specialization of employees. ESU Alameda's several detachments and contractor shops are located throughout the Eleventh Coast Guard District.

After the implementation of the Coast Guard Streamlining initiative (explained later in this chapter), ESU Alameda's internal organization resembles that found in Figure 3.3.

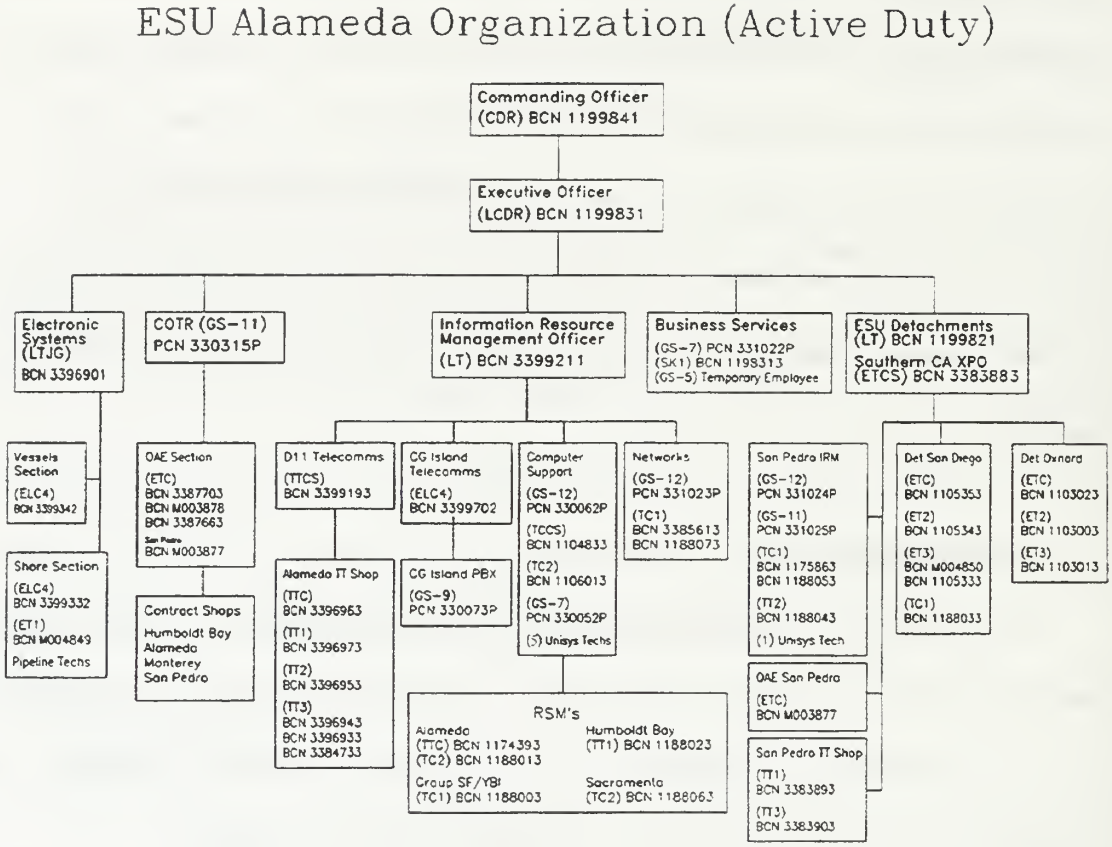

Figure 3.3 ESU Organization, [Ref. 19].

4. Existing Technology

The Coast Guard is transitioning from a proprietary computer system to a Windows NT 3.5 system using the Microsoft Office 95 software suite. ESU Alameda just received this new NT based computer system after using a 14 year old proprietary system since inception of the command. However, they are planning to upgrade to NT 4.0 and the office 97 suite within the timelines of this project and request intranet and database prototype development for the newer platforms. The use of these computer systems is relatively new to ESU Alameda and several small databases have been developed for

individual use. However, the existing databases incorporate data duplication and may not properly address all interest of the command at this time. The two design teams will examine the data used and develop new databases to properly meet the command's operational requirements while preventing data duplication.

ESU Alameda will establish a working NT 4.0 networked platform suitable for their organization before this prototype will be implemented onto their system by a separate thesis design team. Although this creates a challenge for obtaining feedback for graphical user interface development, this delay will not prevent the analysis of existing data and the correlation of such data for prototype intranet specification development which is the primary objective of this thesis.

5. Contributing Factors

Between 1994 and 1998 the Coast Guard reduced their budget by $400 million dollars by downsizing forces by approximately 4000 billets and streamlining the organization. Downsizing involves drastic changes to the existing personnel staffing levels but does not change the mission and responsibility of any organization. For every person cut, another person must pick up that additional workload. This has two major impacts on ESU Alameda:

- fewer people on the operational platforms is likely to cause more requests for administrative and technical types of assistance not directly associated with an equipment casualty.

- Many levels of technical support previously associated with the operational units will now be the primary responsibility of ESU Alameda. However, by virtue of downsizing, this responsibility will not come with the same levels of support personnel assigned.

Since ESU Alameda's billet strength did not proportionally accompany their new levels of responsibility, the remaining ESU personnel must now perform a much larger mission, with a notably smaller staff than had previously accomplished the same tasks.

Driven by streamlining and enabled by ESU Alameda's new computer network, an analysis of critical support processes will enable the design of a prototype intranet which could effectively minimize the time required to perform ESU tasks.

6. Special Requests

Based on private discussions held with the command staff and the workers performing the jobs, it was decided to forego a ranking analysis of processes for Intranet development and rank the major concerns and challenges of the command. This list quickly molded itself based on controllable events, and it was decided to attack two of the most challenging events of the ESU. These challenges are complex and primarily exist because of Coast Guard streamlining, but are within the control of the command. These two requests are:

1. Analyze existing business processes and identify areas where administrative tasks such as leave scheduling, personnel evaluations, and communications could be improved. This system should push down evaluation deadlines and push up travel and

leave requests without requiring any wasted time tracking down paperwork from desk to desk, or relying on self made transcribes as reminders of critical reporting dates.

2. Develop a business model to automate internal funding request, parts orders, parts updates, and enable a push down follow-up prompt to prevent human oversights. The system should enable any person within the command to find out the status of the part from initial order to delivery without requiring the assistance of another ESU employee.

C. CONCLUSION

This chapter provided an overview of Electronic System Support Unit (ESU) Alameda including a brief history of the unit, an overview of the command's functional organization, and mission objectives. Finally, those forces extrinsically motivating the need for internal changes were introduced along with the command's critical requests for the intranet design team. The following chapter focuses on the prototyping process using the prototype development model.

IV. THE DESIGN PROCESS

A. INTRODUCTION

The design of a business application usually begins as a vague concept to either improve an existing process or establish a means to resolve an existing conflict. This chapter will examine the design process by looking at two of the most widely used models, the waterfall model and the rapid prototyping model. Next, a review of the project scope and operating environment will be accomplished and compared against the strengths and weaknesses of these two models. Finally, the methodology used to gather data and the means of establishing the prototype specifications will be presented.

B. DESIGN MODELS

Once the need for a business application is established it can be viewed as transitioning through a series of developmental phases. Usually, a product is conceived through an individual's idea, conceptually coming from any level within an organization. The idea must then compete for funding and political ranking within the organization and then proceed through some form of design, implementation, and maintenance phase. The evolution of this development could enhance or degrade the desired purpose for the application depending on how the design process is handled. Too little control over development could result in an environment where everything becomes chaotic and the focus for the project is lost. Too much control over development could create an environment where the design becomes policy driven to the point where even serious

design issues unsuccessfully compete against a rigid design policy. Without an effective design model in place, certain obstacles for success are predictable, such as:

- The final project was not what the customer wanted (policy driven instead of problem driven)
- The final project takes to long to develop and goes over budget
- Specifications for functionality keep changing
- The need for the project changes

To enhance the successful development of an application, some form of development methodology must be employed to manage the intent of the project and the environment of the organization. This methodology must define the critical milestones of an organization, establish some form of development accountability, address the risks of the project in the initial planning stages, and define the variables and priorities which will ultimately drive the projects scheduling and features.

Several design methodologies exist and the explicit or combined uses of any of them will largely be determined by the needs of both the organization and design team. Each design case will be unique and each design methodology will possess many strengths and weaknesses for each case.

To better understand the potential contributions the two most popular design methodologies offer in the ESU Alameda Prototype development, each will be defined below and then compared to ESU Alameda's situation.

1. The Waterfall Model

Until the 1980's the waterfall model was the only widely accepted life-cycle model [Ref. 20, p. 45]. One of the primary advantages of the waterfall model is the ability to bring unity to projects of a very large scale; especially when involving several different design groups. By using detailed documentation from the point of project initiation through the life of the project, the various design teams are able to effectively bring organizational unity to the design effort. Detailed documentation also facilitates future maintenance actions for a developer who will add additional functionality to an application when the original designer is either no longer available, or simply can't remember what was done. For this reason, the waterfall model is a valid candidate for use if the project is either very large, different groups will perform the design, or the future availability of the original designers are unknown and future maintenance of the application is a concern.

The use of the waterfall model does have some drawbacks which must be considered. Since the waterfall model relies on accurate documentation, it is only a good choice for development if the customer knows exactly what they want the application to do and can effectively communicate those requirements in written context with the designer. For this reason the success of the waterfall model is heavily influenced by both the customer and designer having a thorough understanding of the design concept and needs of the organization. A diagram of the waterfall model is presented in Figure 4.1

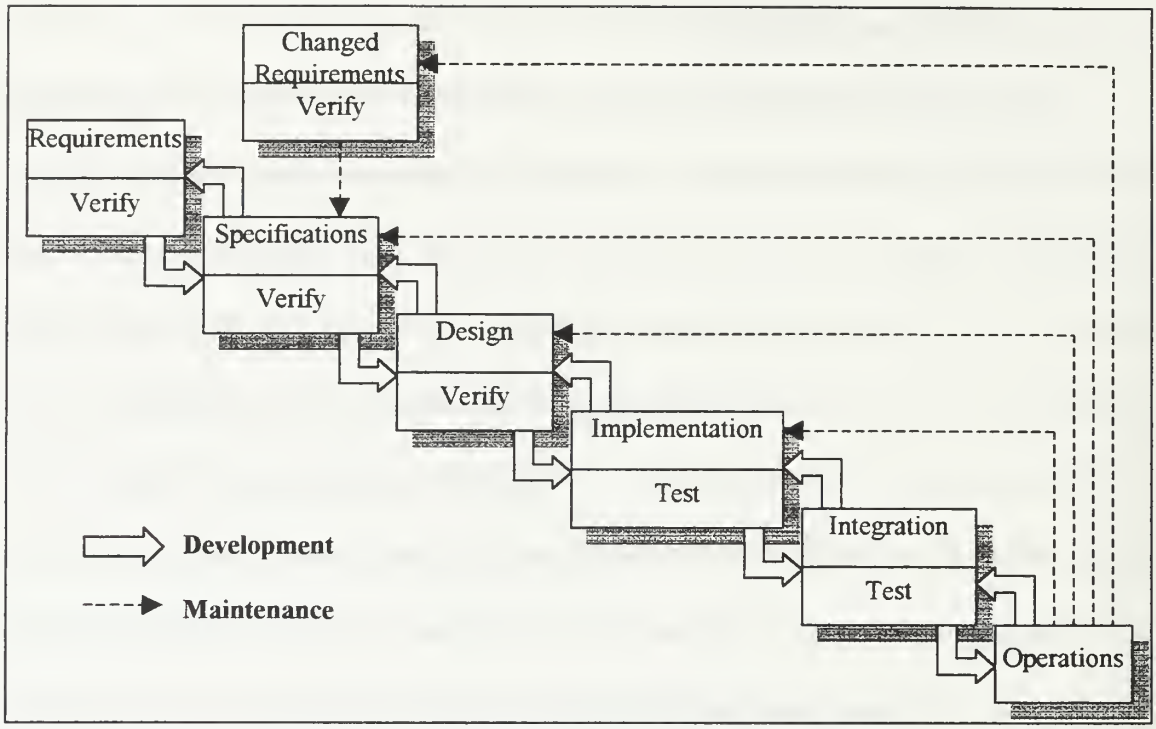

Figure 4.1 Waterfall Model, [Ref. 20, p. 46]

When using the waterfall model, the customer performs the first task by meticulously determining their business environment and defining the specific requirements they need from the developer's application. Once the exact requirements are known, the organization must translate those requirements into a written specification stating exactly what the completed product will accomplish. As previously mentioned, this is one of the weaknesses with the waterfall model. Since the success of the entire design rests with the completeness of the specification, any missing, contradictory, or ambiguous wording may result in serious consequences ranging from a loss in productivity, wasted funds, or changes in political standing for an organization. Even if performed properly, the rigid implementation of each phase combined with the verification and documentation tasks

often leads to extensive project management requirements, cost overruns, project delays, and products that fail to meet the customer's operational requirements.

If the developer has any difficulty associating the requirements from the specifications, feedback is provided to the organization. When this occurs, the specifications must be revised before the development can continue. This is denoted by the feedback arrows originating from a lower positioned box to an upper positioned box in Figure 4.1. An example of this would be the arrow from the Design box back to the Specifications box.

As previously mentioned, the waterfall model is dynamically implemented by the use of feedback loops between each stage of succession to resolve any found discrepancies. Each stage signifies the completion of a development milestone by providing additional documentation to the next segment. Using this methodology, the waterfall model allows for revisions of specifications, design, and associated documentation at all stages of the of the development cycle. This iterative process helps ensure correct documentation exists when the project is finally complete, but can be extremely time consuming to perform.

Another drawback to the waterfall methodology is the requirement for extensive customer testing late in the development life cycle. Since the waterfall model is a time intensive process there is a distinct possibility the customer's requirements may either change or no longer be required before a testable application can be developed. Therefore, the waterfall model does not lend itself to continual risk assessment which may be a desired prerequisite of the customer. Further, if the customer fails to fully understand

the technical documentation produced, a perception of milestone acceptance may be viewed by the developer. There exists a good chance that neither side will realize the project fails to meet expectations until significant resources are consumed and the product reaches the testing milestone. Depending on the complexity of the errors, the entire specification and project may require rework or even termination. A means of reducing the time required for development and ability to obtain customer feedback earlier in the development life-cycle is a major reason rapid prototyping was developed.

2. The Rapid Prototyping Model

This application developmental approach is a systems development methodology created to rapidly deploy a desired application. By unifying the ideas and focusing the efforts between developers and the actual users of the application, the amount of time and funding required to design and implement an application can be reduced. The concept relies heavily on customer involvement throughout the design phases where a rapidly developed prototype is used as an instrument to converse requirements and resolve misperceptions. In this concept, the prototype is defined as a working model that is functionally equivalent to a subset of the product [Ref. 20, p. 49]. The rapid prototyping development process is portrayed in Figure 4.2.

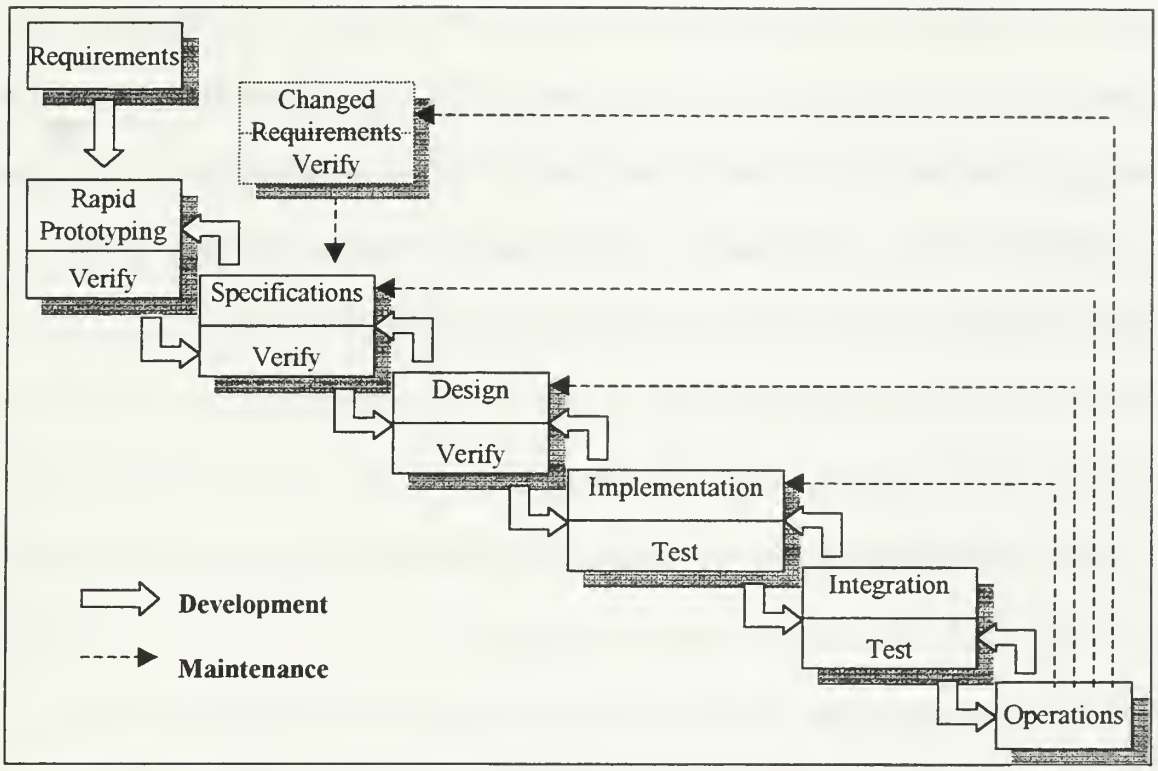

Figure 4.2 Rapid Prototyping Model, [Ref. 20, p. 51]

In this model the initial requirements are gathered by means of interviews, questionnaires, or any other means available to the analyst. The data or processes are examined using CASE tools and the conceptual ideas of the desired application are rapidly developed using any quick design tool available which is capable of rapid change. The analyst and end users then work together using the customers feedback to iteratively resolve all process and data misperceptions and gain a better understanding of the application's requirements. When completed, the prototype becomes the specification for the actual product development.

Using the rapid prototyping methodology enables the customer and developer to quickly agree on the applications functionality. When contrasted with the waterfall model, the need for feedback and time consuming rework between successive layers is

significantly reduced, making the design timeline linear instead of exponential. This is largely due to the fact the user is able to see errors, clarify misperceptions, and offer feedback at the initial development phase instead of the later implementation testing phase associated with the waterfall model. For this reason, the use of rapid prototyping is an ideal methodology for customer's who possess any of the following traits:

- Unsure what they really want
- Have changing operational requirements
- An initial level of risk assessment is desired before obligating for development
- There exist a quick need for the application
- Development is not complex and does not require several disjointed teams

In the rapid prototype model, the completion of the specification means a milestone is reached where the customer has validated the functionality of the prototype and actual design of the application can begin. Since the functionality of the prototype is confirmed during the initial stages of design, the chances of an incorrect specifications are greatly reduced. Therefore, rapid prototyping offers a level of risk assessment for those organizations who are not sure if their requirements are technically feasible.

The implementation phase of both the waterfall and rapid prototyping model often reveals design faults and causes additional delays. However, because the prototype actually tested some functionality of the application, the quantity of design faults using rapid prototyping could arguably be less.

The use of the rapid prototype methodology offers many advantages over the waterfall model but also adds additional challenges to the design process if improperly managed. One of the largest errors made in the rapid prototype development is the use of the original prototype for the actual application. This alternative means is usually an unwise developmental methodology which typically refines the prototype until it in itself becomes the actual application as shown in Figure 4.3. In practice, this concept does nothing more than waste time and money attempting to fix a product that was never intended to meet the operational requirements of the organization and therefore should not be used.

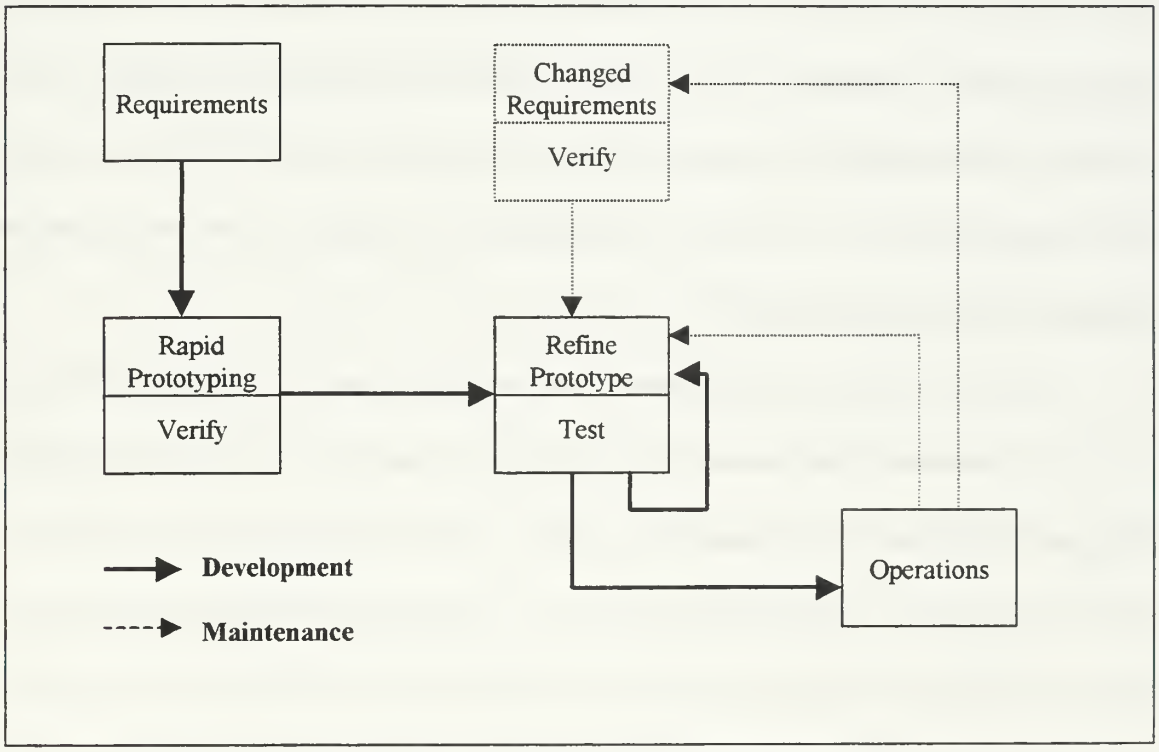

Figure 4.3 Unwise Version of Rapid Prototyping, [Ref. 20, p. 52]

C. SCOPE

The scope of this project encompasses the conceptual design of a baseline Intranet for ESU Alameda. The prototype makes every attempt to change existing business models by decentralizing existing tasks to the lowest possible level so as to free up critical command personnel. Rather than a complete system, the prototype's primary objective is to evaluate existing processes and define requested specifications for ESU Alameda suitable for intranet development. Additional areas suitable for further development and evaluation will be presented in chapter five. The prototype includes the graphical design of the baseline intranet, administrative section, and specifications development for the supply tracking system. The primary objective of this team is to gain an understanding of existing business challenges, analyze existing processes, define ways to improve these processes with intranet development, define a set of specifications for ESU Alameda, and offer feedback assistance to another design team for the actual coding and implementation of the prototype intranet if required.

To develop this prototype, CASE tools will be used to analyze the business processes. However, at the request of ESU Alameda, Commercial Off The Shelf (COTS) Software will be used to develop the conceptual design and specifications. By using COTS, the design remains scalable to new mission requirement and future development by contracted sources as deemed necessary by ESU Alameda. For this reason, existing Microsoft web editors, database software, and office products found at ESU Alameda will be used by the design teams.

D. OPERATING ENVIRONMENT

As previously mentioned, ESU Alameda recently upgraded from a 14 year old proprietary computer system to a networked architecture using Pentium based machines with Microsoft's NT 3.5 operating system and the office 95 professional business suite. In addition, ESU Alameda is planning to upgrade to the Microsoft NT 4.0 operating system and the office 97 professional business suite within the next three months. ESU Alameda would like to use their newer software to minimize additional training required for their employees and therefore request all prototype applications be developed using the mentioned technologies. Using existing software will also enable this prototype development to remain scalable and capable of rapid changes by the organization to meet the evolving mission requirements of ESU Alameda. With the recent transition to this new hardware and software, a baseline system is in need of development to enhance communications while minimizing data duplication.

In addition to the above technical challenges, ESU Alameda recently doubled in size as the result of a Coast Guard organizational streamlining program. This means that ESU Alameda has now absorbed several duties not previously under their control and is now required to perform a much larger mission, with a notably smaller staff than had previously accomplished the same tasks. Therefore, ESU Alameda requested this team study their current business model and identify ways their new NT based platform could enhance the growing organization, making it more efficient; specifically in the areas of administrative oversight and supply tracking.

E. CHOSEN METHODOLOGY

ESU Alameda is currently experiencing rapid changes in organizational structure, duties, and operating guidelines as a direct result of the Coast Guard streamlining initiative. However, even with these business challenges, the organization continues to maintain an intrinsic desire to improve their support services. This motivation is largely due to the commands decentralized use of innovation, a concept that is clearly written within the Commanding Officer's operating instructions:

> I expect each of you to improve our system of doing business, to be innovative, and to think for yourselves. If a policy prevents improvement, or hinders service to the customer, point it out via the chain of command, and I will work on it [Ref. 19].

To meet the needs of the evolving ESU organization, it was decided to use the rapid prototyping methodology over the waterfall methodology for this development. This decision was largely justified for the following reasons:

- ESU Alameda did not have the time, background, or clear idea of the needed functionality of the application to enable a detailed specification to be developed by the organization. The use of rapid prototyping alleviates them of this burden and instills a clearer understanding of the development task by both the organization and developer
- ESU Alameda is evolving and susceptible to rapid changes to meet mission objectives. The ability to meet these potential changes is better suited to rapid prototyping

- Critical ESU personnel are scheduled for transfer, making feedback difficult if not impossible. Rapid prototyping requires the majority of the feedback initially and reduces the need for feedback between successive development stages later on
- Available time of both the ESU and development team was limited to five months, making the rapid prototype the better choice

As previously mentioned, in the design of the ESU Alameda Intranet prototype a specific methodology was employed. Coupled with a short project development timeline and the lack of clear specifications from the user, the waterfall method was rejected. Instead, the ESU Alameda prototype intranet was developed as two different sets of specifications; one modeling the command's administrative issues and one modeling the decentralized use of data for the command's supply tracking system. Both prototypes used similar rapid prototyping methodologies and obtained input from all team members. However, the scale and complexity of the two systems did not allow the same specification development tools to be used. For this reason the two design teams unilaterally analyzed data, provided input for system functionality, and developed graphical interfaces. However, the development of the prototype specifications was separated into two separate teams[1], with each team writing a separate thesis.

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[1] LT Ralph Benhart and LT Dean Dardis comprised the Supply Tracking System team and developed this thesis using Microsoft Access for the specification development tool, while LT Todd Hannah comprised the Personnel Administration team and developed a separate thesis using Microsoft's Active Server Scripting as the specification development tool.

F. DATA CAPTURING

One of the core components in creating a successful application is the gathering of information. At the very start of the project the analyst must obtain an understanding of the existing systems in use and determine how those systems interact with the user's processes. In addition to existing hardware and software constraints, the organization's objectives, short and long range goals, political standing, current stakeholders, and current challenges must be addressed. Depending on the available time the organization and analyst have, one or more of the following methods could be used to obtaining this information:

- Interviewing the users, managers, and stakeholders of the organization. This is thorough, but time consuming
- Interview groups of users of the organization. This takes less time but may not reveal all the details that are required
- Develop and distribute questionnaires
- Obtain and analyze existing documents, forms, and operating instructions. This helps ensure the proper uses of data are understood and provides a means to develop graphical interfaces which are already familiar to the users. It becomes a key part of analyzing processes which will be further described in chapter six
- Directly observe workers in action

For this project an initial trip was made at the onset to gather data and gain an understanding of ESU Alameda's business model, challenges, desires, and political standing. Appendix A is a trip report which records the events of this trip and defines the

ways information was gathered. In short, forms and documents were gathered, structured group and individual interviews were conducted, and a political risk assessment for the project was performed by talking to all members of the organization as well as external stakeholders. Based on private discussions held with the command staff and the workers performing the jobs, it was decided to forego a ranking analysis of processes for intranet development and rank the major concerns and challenges of the command. This list quickly molded itself based on controllable events, and it was decided to attack the top two challenges of the ESU; the personnel administration and supply tracking systems. These challenges are complex, but within the control of the command. Analyzing existing processes and data to develop new business processes to free up the command's limited personnel resources became the primary focus of this project. The analysis of this data is performed in chapter six.

G. CONCLUSION

A background of several known design methodologies was provided to the reader to enhance the understanding of the methodology chosen for this project. Next, a review of the projects scope and operating environment was accomplished to enable the reader to compare the development climate against the strengths and weaknesses of these two models. Finally, the means used to collect information for this project was presented.

V. CANDIDATE APPLICATIONS FOR BUSINESS SOLUTIONS

A. INTRODUCTION

Chapter five will address the potential functionality of the ESU Alameda intranet by providing a brief review on the types of applications typically used within corporate intranets, and then offer suggestions to modify this list for military application development. The majority of this chapter will then focus on the conceptual ideas for applications which would offer significant improvements to the current business processes of ESU Alameda.

Since the primary purpose of this chapter is to present additional applications which ESU Alameda may desire to add to their intranet in the future, after the command has developed an understanding of the capabilities and maintenance requirements of their new system, it could be used as the conclusion to this thesis. However, it was decided to present the reader with this information prior to revealing the data processes of chapter six and specification development of chapter seven to enable a better understanding of the magnitude, potential interrelations, and development challenges of some the proposed applications.

B. A TYPICAL REASON FOR AN INTRANET (REVISITED)

As previously mentioned in chapter two, an organization could use intranet technologies in many different ways to enhance their capabilities and efficiencies. These ways are repeated here for clarity.

> The Gartner Group classifies intranet proliferation and development into three levels. Level 1 intranets consist of low-level implementations, static publishing, or simply moving content on-line. Level II intranet development centers around enabling core day-to-day applications for web use and using the intranet as a workgroup computing platform. Level III intranets will be characterized by a large base of web-enabled applications, a consolidation of dozens of Application Program Interfaces (API's) used in Level II, more secure web servers, and more powerful development tools. Most companies spent 1996 testing intranet waters at level I. Mainstream organizations are expected to develop Level II intranets in 1997 and 1998. By 1999, top organizations are expected to plateau at Level III [Ref. 3, pp. 80-81].

Before we look at specific intranet applications ESU Alameda may want to use in cultivating their new business model, a review of a the typical list of intranet application from chapter two will help remind us of some possible alternatives businesses are currently choosing from [Ref. 2, pp. 8-9].

- Electronic Mail
- Directories
- Organization charts
- Memos
- Personnel manuals
- Benefits information
- Newsletters and publications
- Systems user documentation
- Training
- Newsgroups
- New extracts
- Job postings
- Sales reports
- Financial reports
- Customer information
- Quality statistics
- Vendor information
- Product information
- Marketing brochures, videos, presentations
- Product development information and drawings
- Inventory information
- Network management
- Asset management
- Supply and component catalogs

Although some of the intranet applications mentioned above are applicable to commercial organization, they don't fully suit the military organization. Largely in part because commercial organization are profit driven, usually trying to sell a product or

service to whomever will pay. Where in a military command like ESU Alameda, the organization is budget driven with the services offered and customer base already established. Specializing those applications found above to mirror the functional requirements of a typical military support organization would more closely resemble the following list.

- Leave, temporary duty, and personnel tracking information
- Supply ordering and tracking information
- Electronic Mail
- Phone directories
- Maintenance knowledge base and scheduling
- Contact knowledge base
- Organization charts
- Personnel manuals
- Newsletters and publications
- Manuals and technical references
- Newsgroups
- Billet transfer listings
- Budget, quality, and customer status reports
- Customer information
- Performance measurements
- Historical Coast Guard information
- Product information
- Training documentation brochures, videos, presentations
- Project information and drawings
- Network management
- Asset management
- Supply and component catalogs

C. A BACKGROUND ON INTRANET APPLICATIONS

When evaluating an application for intranet development, there needs to be a clear understanding of how the user will interact with the application, what business processes the application will assist the user in performing, and which pieces of data will be involved.

> It is generally accepted that well-designed applications today have clear divisions between user interface, business rules, and data. This logical division of an application allows significant flexibility in adapting the user interface over time, or applying the business rules to new data sources [Ref. 21]

As previously mentioned, this project will develop a specification for a baseline intranet for ESU Alameda. The user interface, business processes, and data used for this project will be analyzed and presented in chapter's six and seven.

One purpose for developing web-based applications is to improve user efficiency in locating or distributing information within an organization. The types of applications which can be developed to make the user more efficient are immense and only limited by the organizations creativity, employee computing knowledge, or available funding to outsource application development. The applications which can be developed by the organization's employees or development firms are generally placed into one of three types of categories.

1. Publishing Applications

These applications are essentially one-to-many communication systems where information from a department, section, or workgroup is posted and made available to the entire organization. Application of this nature are normally static, easy to implement, and often provide the most immediate and tangible monetary savings. These savings normally take the form of reduced production, printing, reproduction, and shipping costs associated with the paper on which the information was previously printed.

2. Transaction Applications

These applications are two-way interactive exchanges such as requesting or providing information to an organizational database. With these applications, the user normally queries a database and in return receives a dynamically populated HTML page with the results of the query. These applications are more difficult to produce than the publishing applications because they normally require some programming. These are the applications that empower users by enabling them to locate information on their own initiative. Transaction applications enhance productivity by removing the constraints that previously bound individuals to completing request forms or playing telephone-tag with the information source.

Information can be retrieved by the user when desired and on demand when distributed using an intranet.

3. **Community Applications**

These applications are many-to-many, collaborative interactions that facilitate the direct exchanges of information between members in a department, section, or workgroup. This exchange, represents the start of a "thread" that is available for others to review or add relevant information or comments. This thread would be listed in a newsgroup under a subject line, the authors, and an article number and would be available for others to investigate. Community applications are especially effective for project teams that are dispersed throughout a large geographic area but who must still communicate and coordinate their efforts in achieving an assigned project [Ref. 22, pp. 35-36].

The remainder of this chapter will examine some of the possible applications ESU Alameda may desire to develop and implemented to add additional functionality to the baseline intranet described in chapters six and seven.

D. POTENTIAL ESU ALAMEDA APPLICATIONS

1. Administrative and Personnel Tracking System

The tasks of planning, coordinating, verifying, and validating many of the common military administrative issues such as leave request, temporary duty assignments, duty routines, and performance appraisals can be extremely time consuming for an organization to perform. This is especially true for a growing organization such as ESU Alameda. An application where common administrative tasks are performed online would prevent the duplicate and time consuming efforts currently associated with routing paperwork, verifying status, and providing continual feedback up and down the chain of command. To make this concept work, a client server model would be used with an administrative

web application. The application would automate commonly used forms and use a task tracking system to allow users to submit routine request such as leave and temporary duty paperwork from their computer browser. Since the application would allow users to input all routing information, the request would be automatically and immediately distributed to the next responsible person, thereby preventing the need for additional routing paperwork generation. The next individual on the list would automatically be notified a request was made and would be capable of jumping to a predefined web page to act on the request. This application offers another time saving advantage to managers and supervisors since they will no longer have to sift through overflowing inboxes looking for common documents requiring action. In this application, the manager or supervisor is presented a to-do list view of all forms currently in existence where their signature is required. This enables comparison of all open requests and enhances the decision making process. Once acted upon, the request is cleared from the manager's or supervisors to-do list screen, a notification is given to the requestor and next individual on the routing list automatically. In addition, a defined web location is automatically updated which users can view to see the existing status. The need for time consuming status tracking and feedback up and down the chain of command is now completely handled by the application. The tracking application would offer similar functionality for performance marks. A to-do style screen will update key individuals automatically when performance appraisals are due or behind schedule.

2. Supply Tracking System

A customer service oriented support organization such as ESU Alameda heavily relies on the processes of ordering, shipping, distributing, and tracking hundreds of supply parts to perform their mission. Since the lack of any one of these critical parts can significantly impact Coast Guard operations, an application which can track, organize, and provide status information to any member in the command is needed. Specifically, the application must decentralize the Storekeeper's (SK) input of specialized codes, status tracking, and feedback to the technicians which order the parts. Since key command personnel are not always available and there exist a definitive need for various personnel to research status conditions, the application, must offer a mechanism for any member of the command to gain information on the status of a part. To offer accountability, the system must maintain the integrity of the system by archiving all data used. Based on interviews, use of such an application will free up over 25% of the SK's available time and allow this over tasked person to be used in more specialized areas such as budget preparations, contracting, planning, and resolution of difficult requirements.

3. Plan of the Day

Publishing of the Plan-of -the-Day on web pages would enable quick access to current information as well recent or archived information that may be desired from personnel returning from temporary travel. Employees and Coast Guard Reserve components would be able to access this information at any time of the day from either work or home. This could be modified to include specialized information for Coast Guard

Reserve forces to enhance communications on upcoming training, uniform requirements, drills, and mustering locations.

4. Command Phone Book and Email Listing

This application would prevent the current "paper" phonebook from requiring continual publication and distribution to remain current. Using web pages and search engine technologies associated with many of the web products in use would enable users to search for a specific person by name or duty section. Before this type of application is implemented, the command must generate policy for the type of data to display and maintenance of it's accuracy. To prevent data duplication, this application should obtain its data from the administrative areas of the intranet, which will most likely be associated with a database. This way, personal data on employees is updated within the administrative area and phone book at the same time. Since the administrative database will most likely contain private information that the crewmember does not want publicized, the command must determine what information will be published for intranet access. An even more refined listing may be desired for extranet customers if the command would like to make the phone listing available to the other agencies. A good addition to the search tool in this application would be to use hypertext formatting for email listings. This way a user could quickly generate email to the selected person by merely clicking on the hypertext name of the person in the email section of the phone listing.

5. **Maintenance Knowledge Base and Scheduling**

Although very useful, the maintenance of this type of application would need to come from an organization external to ESU Alameda, and is therefore outside ESU Alameda's control. Since the maintenance procedures and servicing schedules are established by Coast Guard Headquarters personnel, the design and maintenance of this application would be best suited for headquarters development and distribution. Development by ESU Alameda would require continual application modifications to keep pace with headquarters changes, making the benefits not worth the costs to implement. Assuming the application was established by headquarters and installed, an ESU Alameda technician could type in questions to aid in the resolution of difficult electronic repairs or to gain information for servicing procedures. A system to help technicians schedule and log preventive maintenance routines would also be useful. If linked to a headquarters intranet application, maintenance data could automatically be tabulated and measured against equipment failures, supply levels, and mean time between repairs to forecast mission impact and budgetary requirements.

6. **Contact Knowledge Base**

Coupled with the large turnover rates associated with military transfers, unique operational requirements, and ESU Alameda's extensive need to collaborate with multitudes of organizations, some form of knowledge base needs to exist to help newer personnel locate key organizations and personnel. Since the electronics funding, equipment, and repair parts used by the Coast Guard originate from numerous Coast Guard and Department of Defense organizations and personnel, deciding where to go

when equipment fails can be extremely challenging. This is especially for newly assigned personnel. Currently, experience is used to link specific equipment to specific people and specific organizations. But this information takes time to learn and is regularly outdated, forgotten, or misplaced. Even when the correct information is located, large amounts of research duplication is conducted within the ESU command because the technology does not exist to enable collaboration. However, with the installation of the intranet a Contact Knowledge Base application can be used to share information, reduce research times, and enable easier updates to modifications. This type of application will work similar to a web search engine and the unit phone book. A user can use search engine technology within the application to type in equipment nomenclatures, titles, or any other information known to track a specific piece of equipment to produce a listing of all matching resources. The listing will then provide a detailed summary of the organization and person associated with that piece of equipment and how they relate to ESU Alameda. The user then matches their current operational need against the list of resources until a match is found. The list can be shared and maintained by everyone using it, so as changes occur, they only need to be updated once to make it beneficial to the entire command. The use of the application will continually evolve as people enter more and more information into the system. This type of application will help reduce the time required to bring new personnel up to speed and minimize the command pains associated with loosing 25% of the crew each summer during the annual transfer season.

7. Operating Instructions, Personnel Manuals, Newsletters, and Orientations

The use of web based personnel manuals, operating instructions, newsletters, organizational charts and orientations will enable personnel to quickly become acclimated with command procedures. Orientations on command history, operating procedures, and accomplishments can be used to mold the new personnel into the desired culture of the command. As mission goals change, this application will enable the quick modifications to business policies. In addition, the use of a web-based application will help mold mental models and instill group learning as organizational changes are required by using media which is more impacting than written text alone. Currently over 100 manuals are published and distributed biannually to organizations supported by ESU Alameda to offer guidance and procedures. However, ESU Alameda has no guarantee that the current versions of these manuals are made available to the key members ESU Alameda interacts with. This creates a burden for both ESU Alameda and the key members of the supported commands. By using a web-based application, every individual with a computer and intranet/extranet access will be able to interact with the most current ESU publications available. Therefore, not only will this application enhance the learning environment of the ESU employees, but it will also enable better distribution, reductions in biannual publishing and distribution fees, and access to current information by those commands supported by ESU Alameda.

8. Newsgroups

The use of a newsgroup application by the ESU employees would enable them to solicit information and keep abreast of technology changes with the rest of the world. In addition, internal newsgroups could be established and made available to employees or other Coast Guard organizations. Since any post to a newsgroup outside the organization will have a military extension on it, strict command policy must be implemented governing the types of groups which are accessible and the extent of information which will be exchanged. Since the use of internal newsgroups are proprietary, the security aspects are much less complex and easier to implement and enforce. For this reason, ESU Alameda may want to only use internal newsgroups, or restrict access to these groups to only selected Coast Guard Commands.

9. Customer Knowledge Base

Coupled with the large turnover rates associated with military transfers, unique operational requirements, and ESU Alameda's extensive need to collaborate with multitudes of organizations, some form of knowledge base needs to exist to help personnel locate technical information about supported commands. For example, a typical ESU supports several classes of ships, each with different equipment and different engineering parameters. Some of these organizations have unique challenges such as electronic power or grounding problems, cable access challenges, or antenna location constraints to name a few. This makes it difficult for any remote personnel to plan future installations, forecast engineering challenges, or simply offer technical assistance since each class of ship is so unique. However the use of a customer knowledge based application would enable a user

to search out needed information on a specific Coast Guard unit, and receive details such as wiring diagrams, photographs, known problems, archived repairs, and past engineering studies. In addition, existing fault parameters could be input to the application and assistance provided on probable causes. However, the development and maintenance of such an application would be enormous and beyond the capabilities of ESU Alameda. Nevertheless, it would be of immense help and could be linked to a headquarters application to enable additional engineering and maintenance research.

10. Military Transfer Knowledge Base

With the average ESU member transferring every three to four years, an application to assist personnel plan for these moves would benefit morale and reduce the current planning time required by Coast Guard families. Currently, manuals are published listing all billets in the Coast Guard, however, these manuals become outdated the minute they are published. To inform Coast Guard personnel which billets are to be vacated and made available for selection, Coast Guard members can have information sent to them by means of a multiple page facsimile. However, these sheets are often difficult to read and offer little insight into the requirements of the job and offerings of the community.

Development and maintenance of a web-based application by Coast Guard Headquarters and used within the ESU Alameda intranet would allow access to current billet descriptions, rotation dates, phone numbers, and skill requirements, as well as community information, housing, schools, and points of interest. To accommodate special family needs such as medical or school challenges, a knowledge based application would interact with the user to locate possible openings which meet those specified requirements.

This type of application would mirror with current Coast Guard Work-Life initiatives, reduce stress levels associated with moving, increase morale, and reduce some of the time management challenges currently plaguing program managers in negotiating possible transfers with Coast Guard members.

11. **Customer Request, Measurement, and Report Generation**

Currently ESU Alameda customers request assistance through means of radio broadcast message traffic, phone calls, personal visits, or email. To conform to Coast Guard measurement guidelines as well as focusing on command effectiveness, designated ESU employees track and measure open requests, contracted performance, and funding information for compilation and generation of monthly reports. Since there are no ESU billets authorized for this function, these tasks are assigned as collateral duties to several ESU employees. Although this provides many positive aspects for the command it also reduces the available time of the technicians and crew. For this reason the available time for workloads is more reactive to equipment failures than proactive in preventive maintenance and planning. A web based application would automate some of these tasks and enable ESU employees to better utilize their available time. In addition, online generation of these reports would reduce the costs associated with publishing and distribution and enable real-time feedback to organizations needing this information. Additional functionality could be added to this application by linking it with the supply tracking system. Coupled together, these two applications could build a knowledge base capable of forecasting and graphing workloads, budget requirements, and supply ordering requirements for each supported platform on a calendar basis. Such a system would

significantly aide the organization in scheduling future projects, leave request, quarterly budget distributions, and just in time training requirements.

12. Training

ESU Alameda currently performs several types of specialized training for such things as new personnel indoctrination, new application familiarization, or to establish specialized skills for an upcoming project. To facilitate this training and enable just in time learning, a web-based application could be established and interactively used as needed. This application could be requested by the needing user anytime, therefore eliminating existing scheduling conflicts between the trainer and trainees. Using brochures, video, and internally generated PowerPoint presentations, almost any type of training presentation could be accomplished. If hands-on training is required, the development of a training kiosk may offer more interaction with the training platform. Although some specialized training may require professional development, many of the training tasks associated with annual certification and project preparations could be developed by ESU Alameda.

E. CONCLUSION

This chapter addressed the potential functionality of the ESU Alameda intranet by providing a brief review on the types of applications typically used within corporate intranets, and offering suggestions for military application development. The majority of the chapter focused on applications which would offer significant improvements to the current business processes of ESU Alameda.

Now that the reader can visualize the complexity of the various applications that would make up an ideal ESU intranet system, the design of the baseline intranet focusing on administrative issues and data analysis of the supply tracking system will be presented in the next chapter. ESU Alameda may wish to review chapter five as time goes on to consider future development considerations above that presented in the next two chapters.

VI. ANALYSIS OF CLIENT'S BUSINESS PROCESSES

A. INTRODUCTION

Since Data Flow Diagrams (DFDs) are one of the most widely used tools for modeling business processes, they will be used within this thesis to analyze the functional activities of ESU Alameda. To enable the reader to follow this analysis, the chapter will start with a brief history on database functionality. Followed by an overview of DFD symbols and implied rules. After presenting the required background material, the remainder of the chapter will present the DFDs derived for the ESU Alameda Business model, offering insight to current business practices and enabling a visionary look at what post intranet implementation may achieve.

B. HISTORY

Databases are categorized by the way they maintain data relationships [Ref. 23, p. 15]. Early databases were nothing more than flat file systems that allowed a user to archive information and serve as electronic filing cabinets. Due to the very nature of this type of database, it typically led to data redundancy, which is the saving of redundant information on different databases. As a result of data redundancy, the data itself becomes difficult to maintain and is usually inaccurate in at least one of the databases used. However, since the 1960's major changes in database design have been made to help correct this problem.

The 1980's brought about the use of relational databases which significantly improved the management of data, reducing data redundancy. Data stored in one table

could now update many other tables or databases through shared resources. In addition, access to these tables could now cross several types of database platforms. For example, Microsoft Access could now read and write to a database written in dBase or Paradox. For database users this was a revolutionary accomplishment because developers were now able to use data already located in various databases rather than recreating the data themselves. Figure 6.1 offers a good overview of the features and technological changes that have occurred in database design.

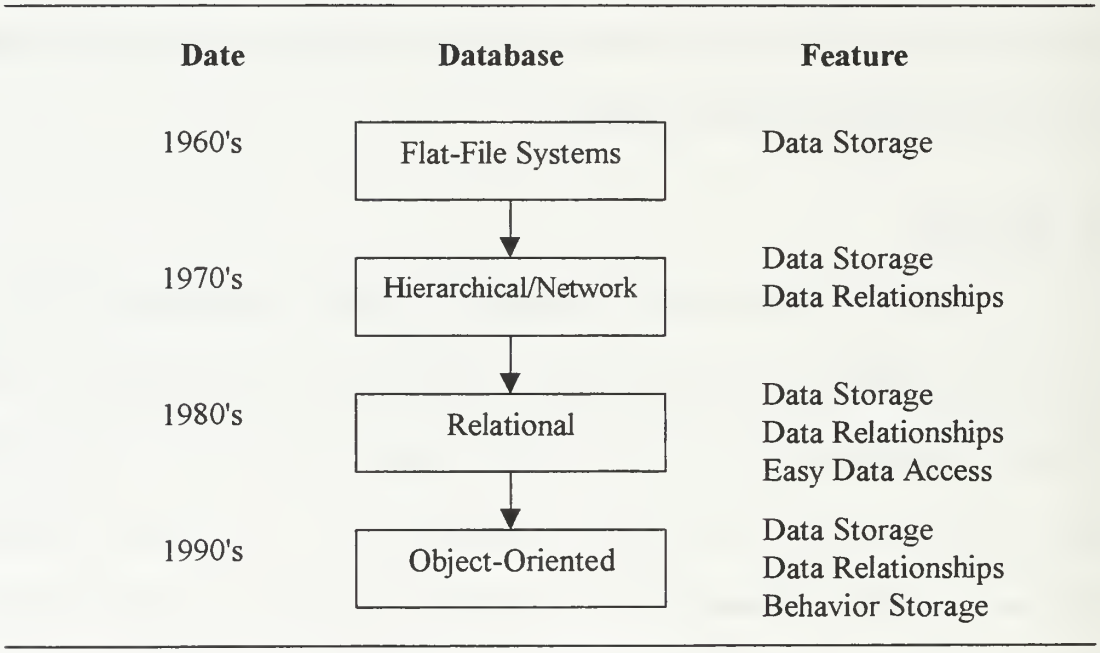


Figure 6.1 Evolution of Database Architectures, [Ref. 23, p. 16]

C. PROCESS MODELING

Process Modeling is used by designers to gain an understanding of what is occurring within an organization. By using such a graphical interpretation of the processes involved an organization's business model can be understood.

> An effective diagram has two primary functions: it records and communicates. The effectiveness of a diagram is contingent on its clarity and completeness. No matter how accurate a diagram is, if the information it contains is not easily understood by its user, it is practically useless [Ref. 24, p. 1].

This concept is the basis for the development and use of Data Flow Diagrams (DFDs). Therefore, DFDs are primarily used to clarify information flow within organizations, to locate redundancies, and to determine the requirements of the organization. Although there are several different modeling tools available, the advantages with using DFDs, is that there is only one set of rules and only four symbols used to represent the data flow. Figure 6.2 will enable the reader to translate the associative meaning of the two common DFD symbol sets currently in use:

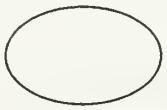
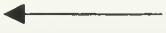
DeMarco and Yourdan		Gane & Sarson
	Process	
	Data Store	
	Source/Sink	
	Data Flow	

Figure 6.2
Comparison of DeMarco and Yourdan and Gane & Sarson DFD symbol sets, [Ref. 25, p. 315]

Regardless which DFD symbol set is used, a defined and common set of rules are used to add meaning to the analysis. Since these rules are implied, the reader must understand them before reviewing the ESU Alameda DFDs if proper analysis is to be interpreted. For this reason, a brief explanation for the use of the four symbols will be presented, and then followed by the rules associated with their use. A description of the four symbols represent in a DFD are as follows:

1. **Process:** The work or actions performed on data so that they are transformed, stored, or distributed.

2. **Data Store:** Data at rest, which may take the form of many different physical representations (i.e. a file folder, notebook).

3. **Source/sink:** The origin and/or destination of data sometimes referred to as external entities.

4. **Data flow:** Shows the direction that data is flowing through a system [Ref. 25, p. 315].

As previously mentioned, the use of DFDs is simplified by the small symbol set and single set of implied rules. This feature enables analyst to share their DFDs with many different designers without the need of written details. Just like the phrase "a picture is worth a thousand words" the DFDs tell the story which may otherwise be misinterpreted in written context. To enable the reader to understand the ESU Alameda DFDs which will be presented later in this chapter, the DFD rules will be presented in an easy to access format suitable for quick reference later on. These rules are as follows:

Entities

- Relationships between Entities are not modeled
- Entities never communicate directly with data stores

- Entities are always named using a noun label
- Changes to Entities can only occur through data interchange with the Main Process.

Processes:

- Processes are always named in a verb phrase label
- Processes may be done in parallel

When working with Processes, you should avoid the following:

- *Black Holes*: A process with only inputs. See Figure 6.3

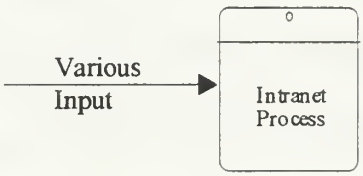


Figure 6.3 Black Hole

- *Miracles*: A process with no inputs and only outputs. See Figure 6.4

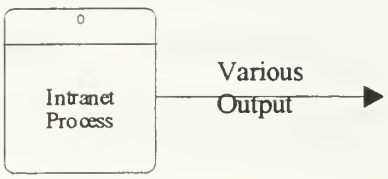


Figure 6.4 Miracle

- *Grey Hole*: Insufficient inputs to produce the outputs. See Figure 6.5

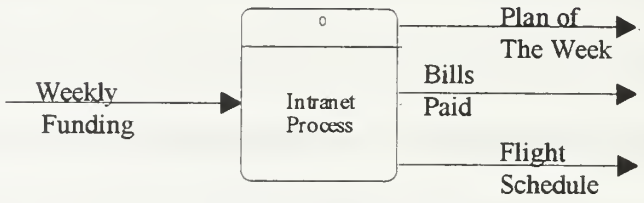


Figure 6.5 Grey Hole

Data Store:

- Data cannot be interchanged between other data stores. The data must pass through a process initially
- Data Stores do not change (process) any data
- Processes are always named using a noun label
- Data Stores may be repeated on a diagram

Data Flow:

- Data flows are drawn in one direction between processes. If data is Bi-directional, two data flows must be drawn.
- A Data flow to a Data Store means Update
- Data flow from a Data Store means Retrieve
- Processes are always named using a noun label

DFDs are hierarchical by design. By this we mean the Context Level diagram is the parent and is the highest level diagram possible, showing the an entire organization as one process. When viewing this diagram, the user will be able to see those entities

external to the organization that interact with the main process by the transfer of information. Decomposition of the Context Level diagram is used to obtain child, or lower level DFDs. When doing this, the decomposition of the Context Level diagram leads to a Level 0 diagrams with a numbering convention of 1.0, 2.0, 3.0...x.0. Further decomposition of these processes lead to Level 1 diagrams that follow the numbering convention of 1.1, 2.1, 3.1...x.1. This decomposition of a processes can continue until the primitive, or lowest level DFD is obtained. When looking at the entire numbering convention used, typical numbers for lower level diagrams could be as follows: 1.1.1, 1.1.2, etc.

Balancing DFDs is essential for accuracy and is defined as the conservation of inputs and outputs to a data flow diagram process when the process is decomposed to a lower level [Ref. 25, p. 324]. This means that as the diagrams are further decomposed the input and outputs associated with a given process must be accounted for throughout the Child and Parent relationships.

D. ANALYSIS PHASE USING DATA FLOW DIAGRAMS

As previously mentioned in chapter four, data was gathered from ESU Alameda by obtaining various forms and publications as well as conducting individual and group interviews. During the interviewing process the functionality of various forms was determined and compared against the business models of the organization. Of all the forms collected, it was determined that four actually applied to the business model this team was asked to improve and therefore analyzed for intranet implementation. These forms included the supply Procurement Request form, Bill of Lading form, Requisition

Log (SURF Sheet), and the administrative standard Leave Request form. In addition, the team decided to include additional administrative data on the intranet because of its related use and similarity of development. This data includes the Command Phone Book, Temporary Additional Duty (TAD) log, and crewmember directories.

To accommodate all of this information without sacrificing security the intranet was developed in two sections. The secure section was termed the intranet, while the less secured area was termed extranet.

> A full service Intranet is a TCP/IP network inside a company that links the people and information in a way that makes people more productive, information more accessible, and navigation through all the resources and applications more seamless than ever before [Ref. 23, p. 57].

The extranet provides some of the same information as the intranet but is not subject to all of the security and privacy aspects desired in a corporate intranet. Without an additional security measure such as a firewall, the extranet is accessible to anyone who has access to the internet and the correct Uniform Resource Locator (URL) or internet address.

Throughout the analysis of data, emphasis was placed on redesigning the business process and not simply automating it. By simplifying these transactions with the use of DFDs, redundancy was identified and data integrity increased. Although we've explained data redundancy, we need to examine data integrity. *Data Integrity* refers to the ability of the distributed database to manage concurrent updates to data in many physical locations and ensure that all of the data is physically and logically correct [Ref. 26]. Therefore, by

reducing data redundancy and increasing data integrity the overall accuracy of the system will increase.

Many simple administrative tasks such as filling out a Leave Request or Parts Ordering require many steps and man-hours to route paperwork through an inefficient system. Therefore, one of the goals of this thesis will be to reduce the time and effort involved in completing a task.

This remainder of this chapter presents the DFDs developed for both current and new business processes selected for intranet application. The applications that were not used on the intranet but were evaluated at length are included in Appendix B. Detailed explanations of the process interactions within the current business model are included in Appendix C.

1. Existing Business Models

Figure 6.6 shows the current business model for the Leave Request process. A person requests leave through the process and gains approval from immediate supervisors. Upon approving/disapproving the leave request the form is routed to the Executive Officer who provides final approval/disapproval for the requested leave.

The Leave Request process is further decomposed in Figure 6.7. Here the leave request is filled out and the leave form is routed from supervisor to supervisor. Upon final approval/disapproval the request form is sent back to the originator.

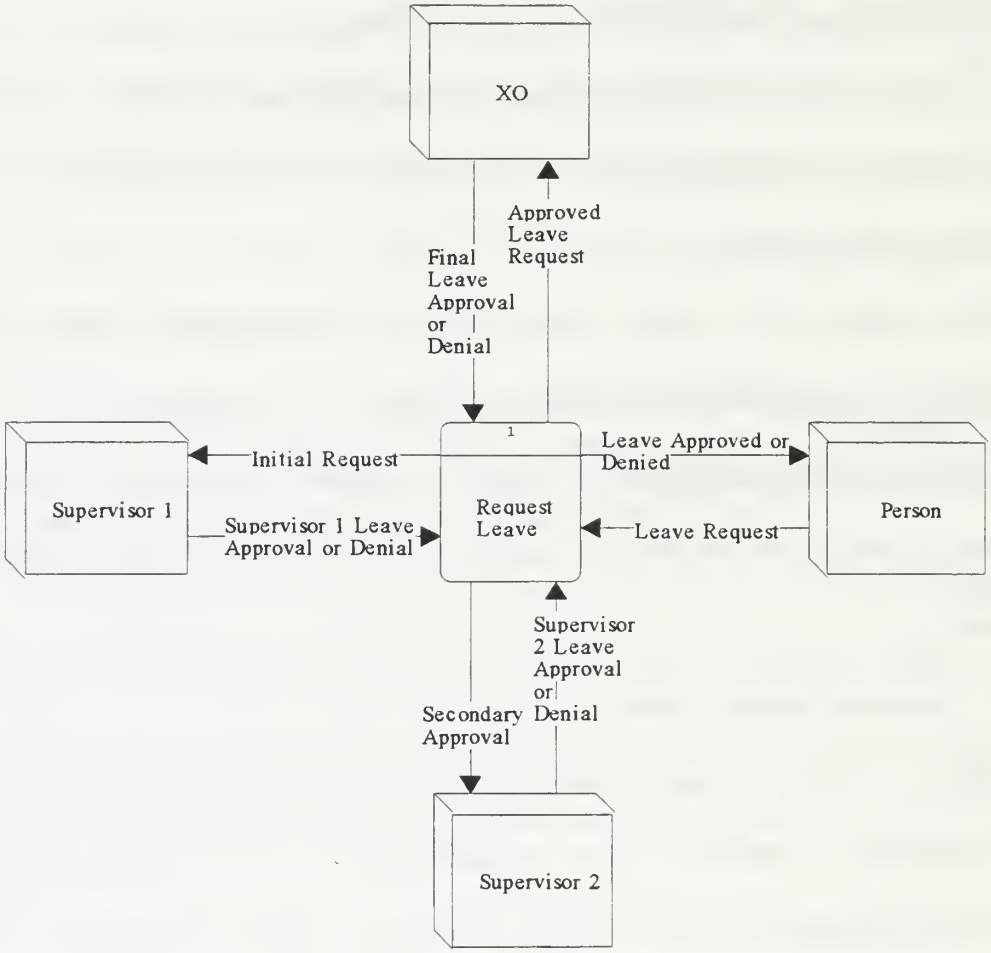


Figure 6.6 Context Level DFD - Leave Request

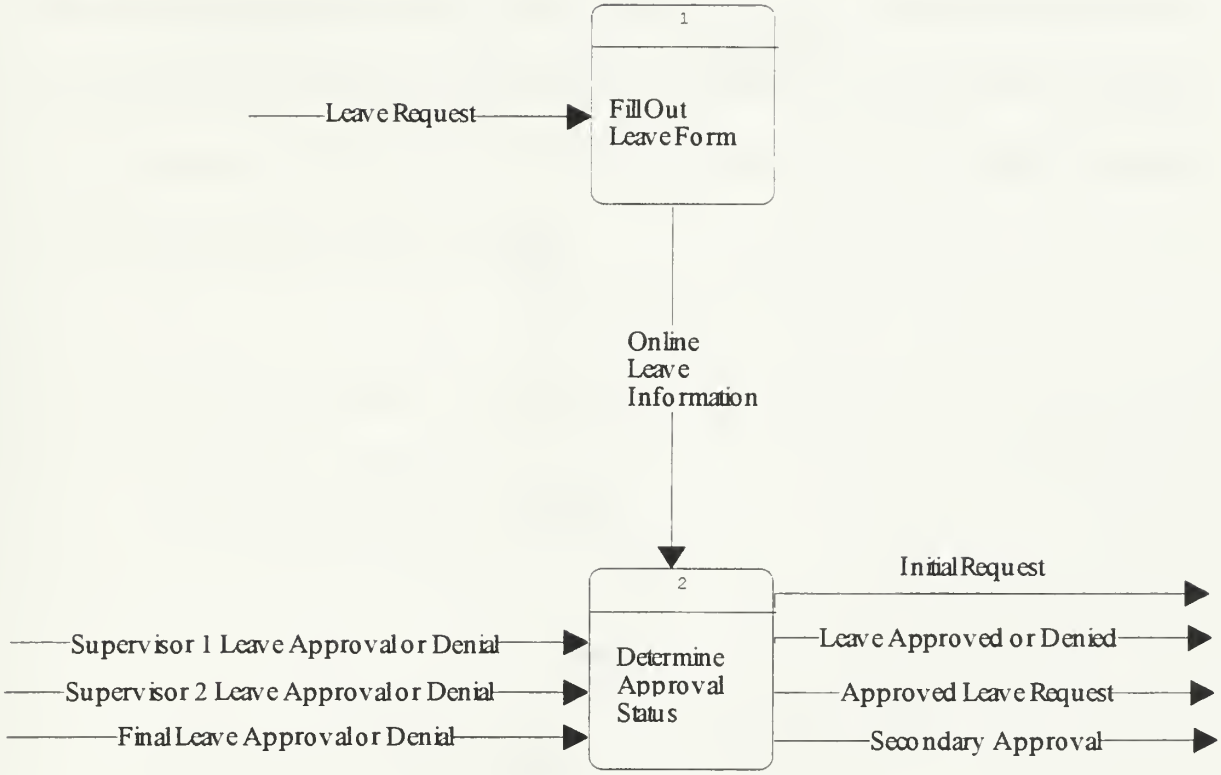


Figure 6.7 Level 1 DFD - Leave Request

Figure 6.8 presents a good example of how a process was automated without adding any functionality to the system. Even though the leave form is input into an automated system, by email, the status updates and retrieval of archived information is performed manually and may actually take more time to perform than the previous paper method. For example, when the paper version was filed there existed a filing scheme. With the use of email, the location and sequence of a request is unknown and could be located in several different locations.

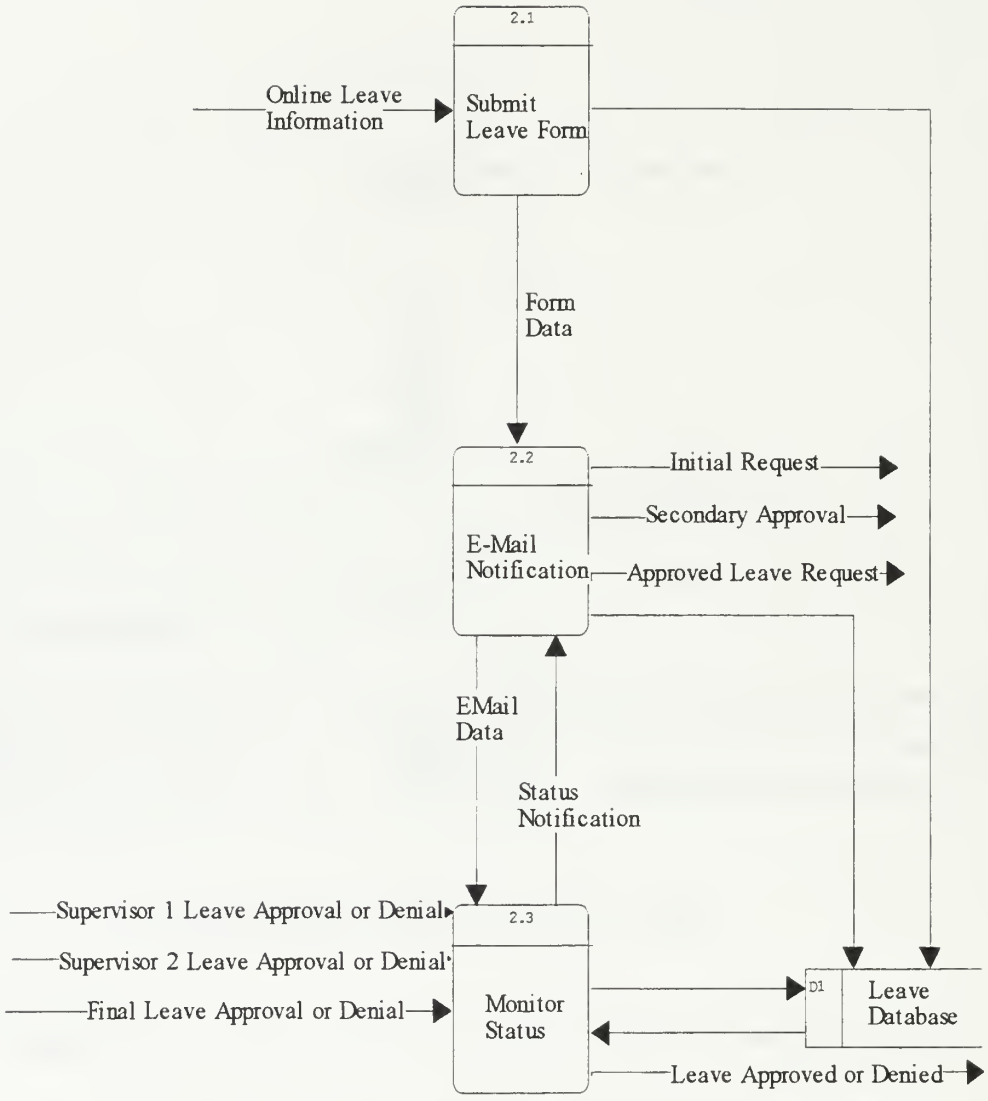


Figure 6.8 Level 1 DFD - Leave Request

Figure 6.9 presents the Context Level diagram for the current Parts Ordering System. The function of the Parts Ordering process is to act as focal point for all of the command's part requests, including budget verification, quality control, ordering, tracking forecasting, and transportation of materials. This process is the cornerstone to making the command operate efficiently and is the number one request of the command to attempt to resolve inefficiencies within the system.

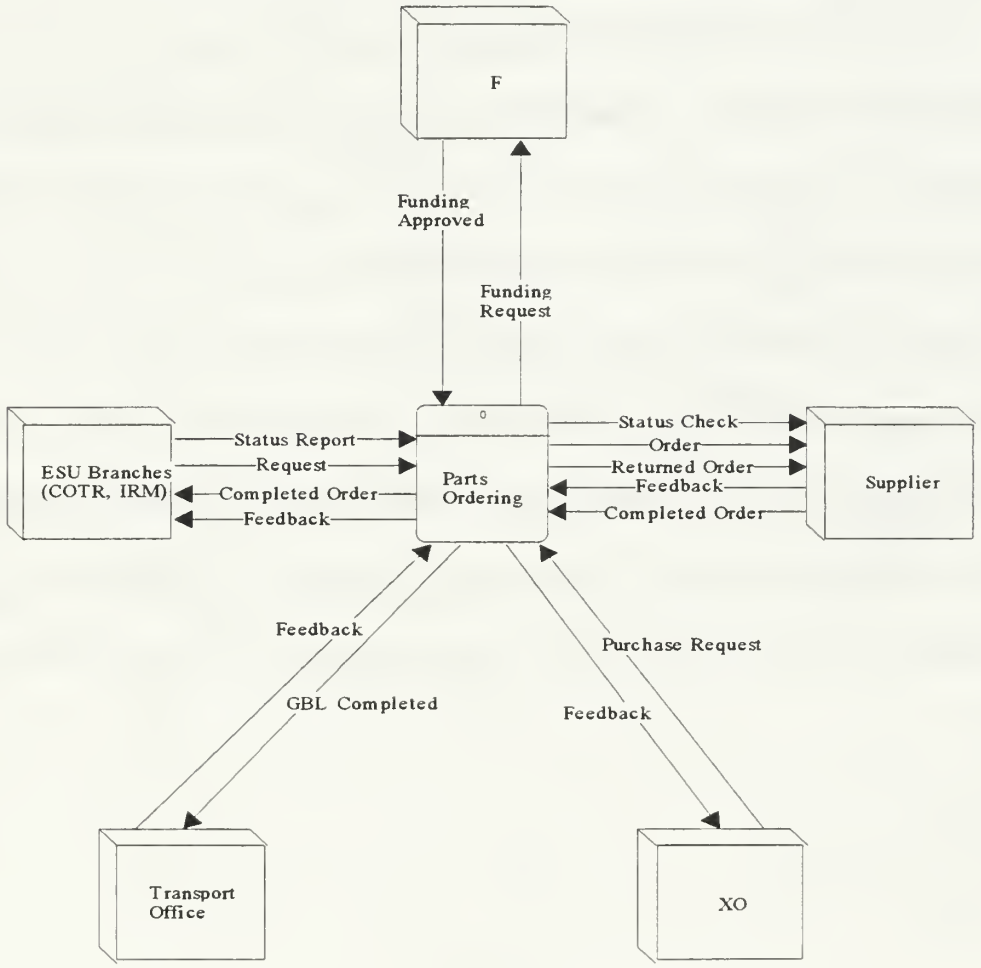


Figure 6.9 Context Level Diagram - Parts Ordering

The Parts Ordering System is further decomposed in Figure 6.10. As can be seen in this data flow diagram, the ordering a single part becomes a very complex and time consuming evolution. There is a minimum of eight different processes that the requested part must go through before it can be completed. Delays are introduced by the processes themselves as well as the way information is passed. In this case, most paperwork must be physically "walked" to the next process.

Since ESU Alameda heavily relies on the timely processing of parts request to repair electronics equipment, a means to make this system more efficient is clearly in need. In addition, the Storekeeper is currently overworked, spending more than 25% of the average day tracking down the various stages of these processes. Therefore, developing an intranet based system capable of improving the existing business model will have notable impact for all members of the command, a feature which is needed to enable the successful acceptance of the intranet and new business model. Because this resolution of this process is requested by the command and is determined to benefit every user of the organization, deriving a better business model became one of the top objectives of this project.

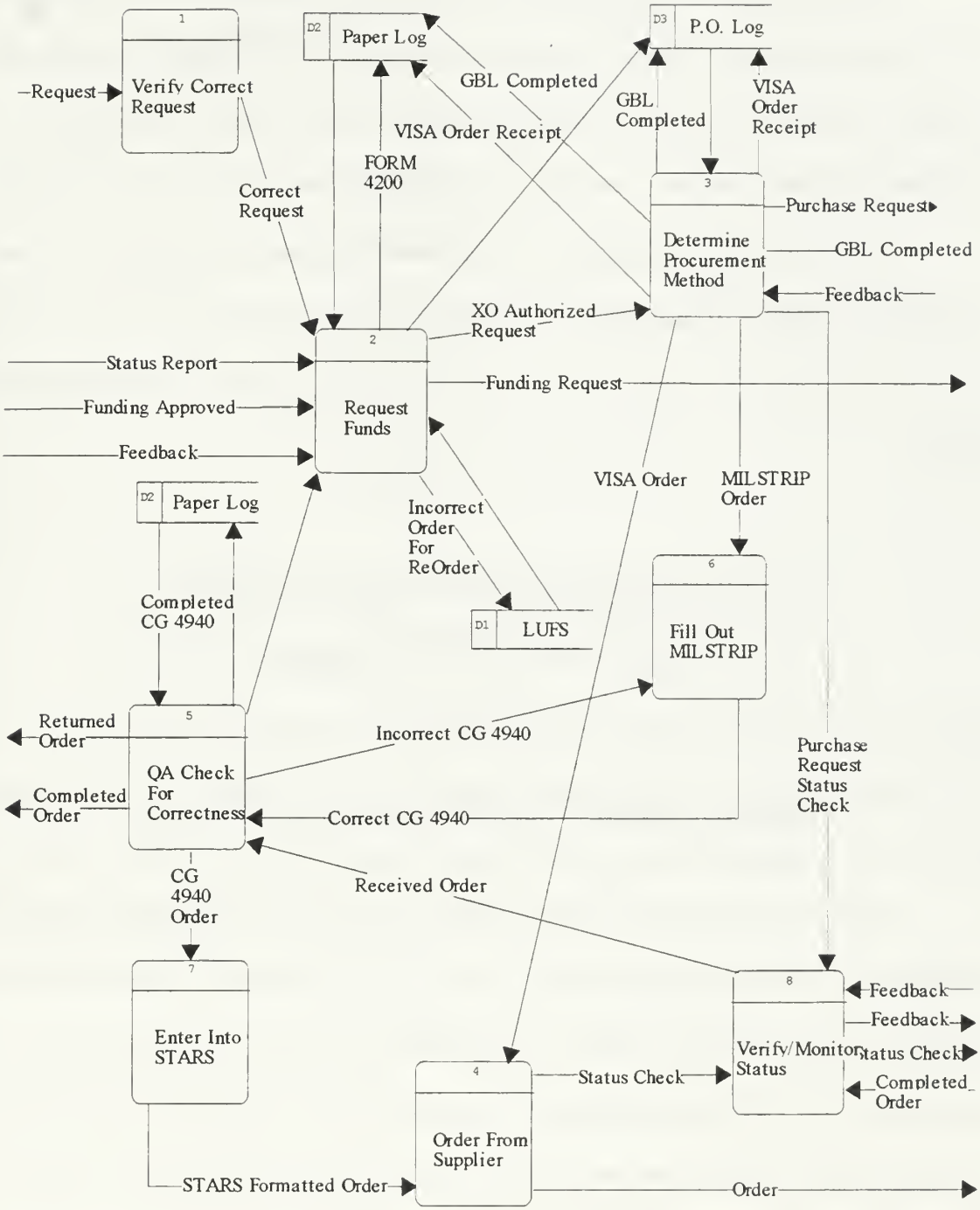


Figure 6.10 Level O DFD - Parts Ordering System

2. **Intranet Based Business Models**

Figure 6.11 through 6.19 presents the redesigned business models enabled by the ESU Alameda intranet. These new processes allow a one-stop location to accomplish in minutes or hours what used to take hours, days, or even weeks to accomplish. The intranet based design depicts a well thought out approach that is extremely user friendly.

It is the intent of the design team to reduce the required work efforts and times by centralizing all of the Administrative and Supply tools in one location. As can be seen in Figure 6.11, there is a central point for users to enter the intranet to accomplish these tasks.

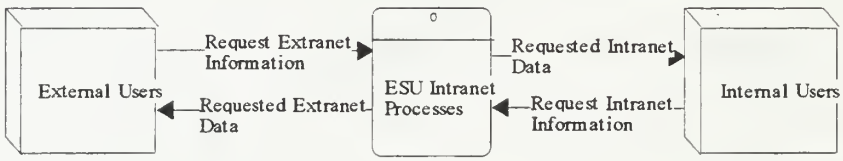


Figure 6.11 Context Level DFD - ESU Intranet Processes

Once the user enters the main interface, the user has the choice to access the Member or Public sections as portrayed in Figure 6.12. To enter the Public area the user simply selects the extranet. There is no requirement to log into an unsecured area. To access the intranet all users must login with an authorized user name and password. Upon successful login the user enters the Member's area where secure information is kept. If the log in is unsuccessful they are returned to the main screen.

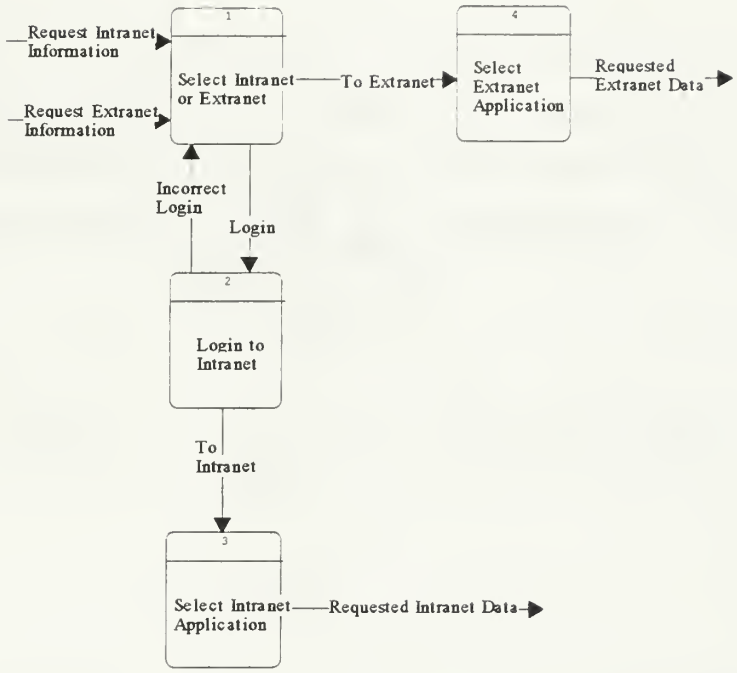


Figure 6.12 Level O DFD - ESU Intranet Processes

Decomposing Process 4 to the next level allows access to limited resources on the extranet as shown in Figure 6.13. At this level there is access to multiple resources, such as FAQ's, what's new on the intranet, and access to the unit phonebook. Process 4.2 allows access to the unit phonebook.

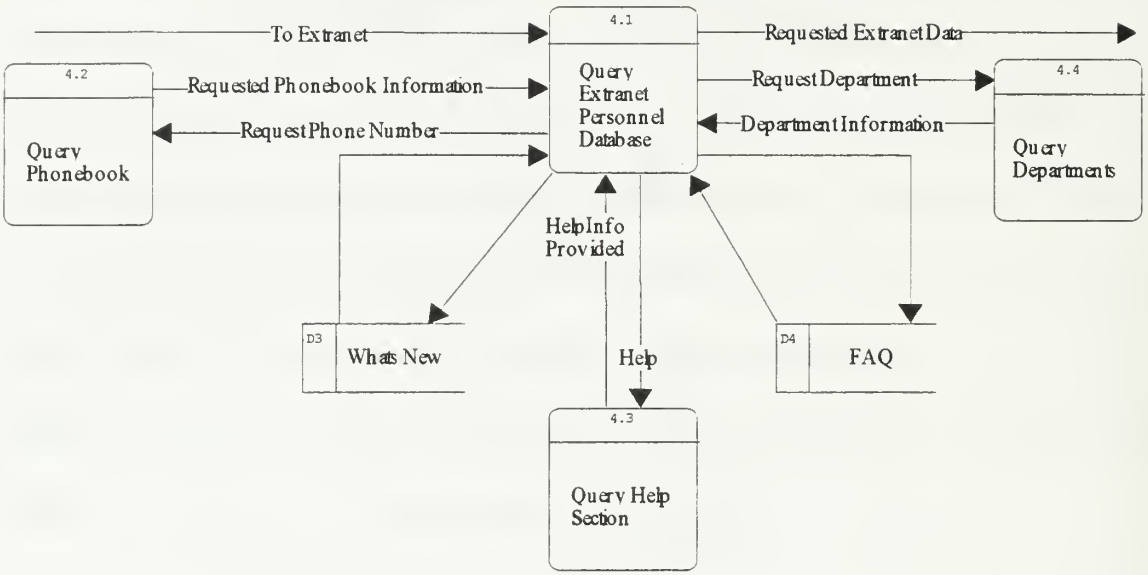


Figure 6.13 Level 1 DFD - Select Extranet Application

Process 4.1 is further decomposed in Figure 6.14. Within this process, process 4.3.4 enables additional menus options to the user such as Suggestions, Chat Room, and intranet wide search capabilities.

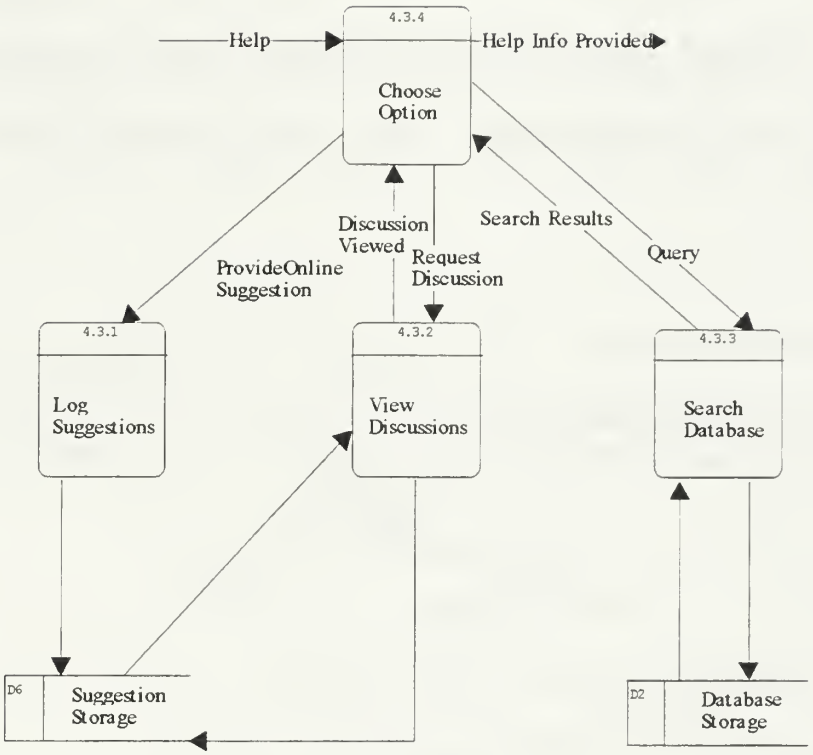


Figure 6.14 Level 2 DFD - Query Help Section

Process 3.1 is the Level 1 DFD for Process 3 of Figure 6.12. This Process allows the option of entering the Supply or Administrative areas of the intranet.

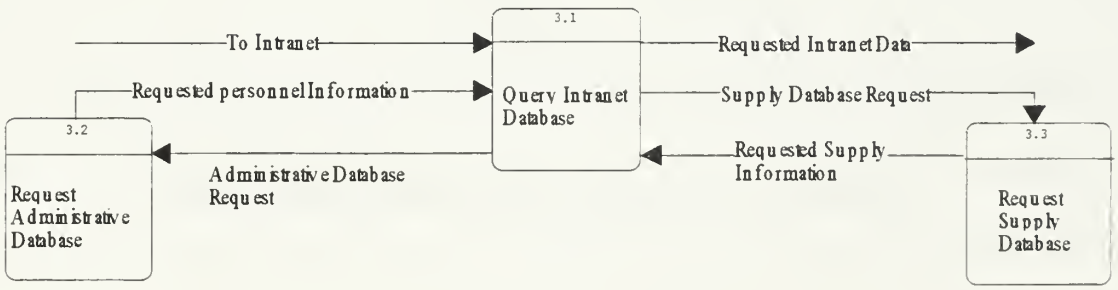


Figure 6.15 Level 1 DFD - Select Intranet Application

Figure 6.16 reveals the Processes that encompass the Supply Section of the intranet. Process 3.3.2 allows any of three forms to be filled out online, read the database warning, or exit to the main menu. Screen shots of the four forms will be provided in chapter 7.

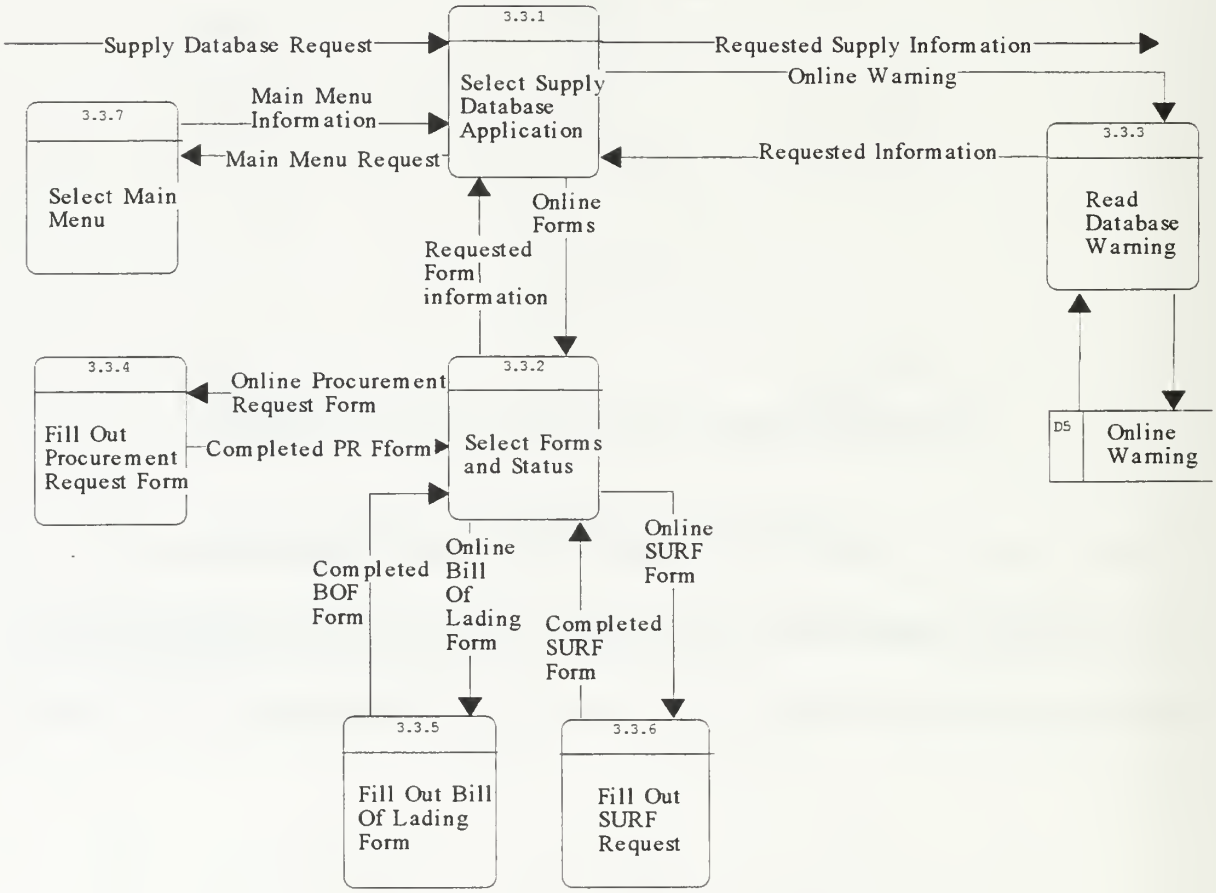


Figure 6.16 Level 2 DFD - Select Supply Applications

Figure 6.17 presents the processes that encompass the Administrative Section of the intranet. Process 3.2.2 allows access to either Administrative Reports or Administrative Forms.

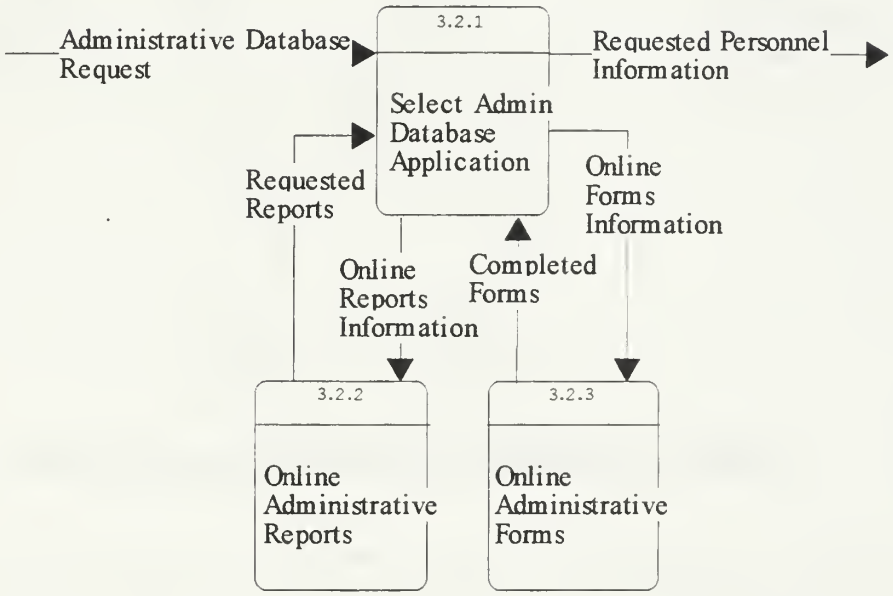


Figure 6.17 Level 2 DFD - Select Administrative Applications

Figure 6.18 allows the user to view any of four reports online. These are dynamic reports and are enabled through the processes in Figure 6.19. Reports are also available at demarcations of thirty and sixty days prior to going TAD or on leave. This information is essential for command planning purposes and relinquishes time spent by managers and supervisors in tracking this information.

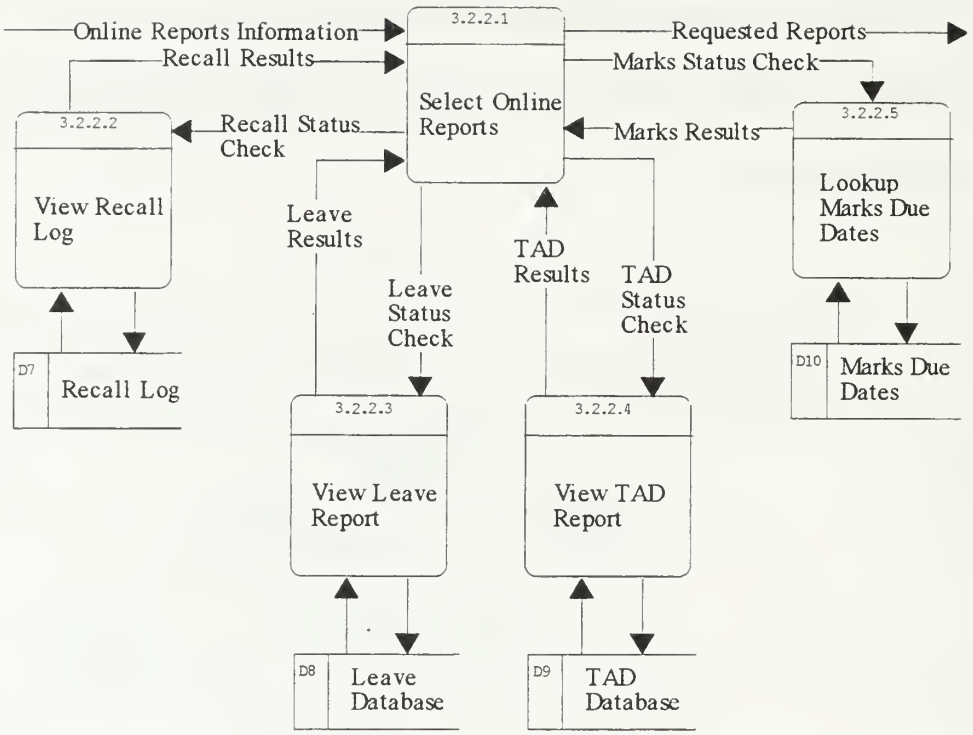


Figure 6.18 Level 3 DFD - Select Administrative Reports

Figure 6.19 allows users to select online forms. In this Data Flow Diagram, Process 3.2.3.2 enables the person who filled out a leave request to monitor its status without requiring time consuming research of supervisors and managers. As the leave request advances through the system, annotations approving or disapproving the request will be added. This allows for instant response and monitoring. In similar fashion, Process 3.2.3.3 allows the user to request TAD orders online. Both of these processes are capable of being updated at anytime. Leave or TAD requests are archived for future use to allow for historical tracking.

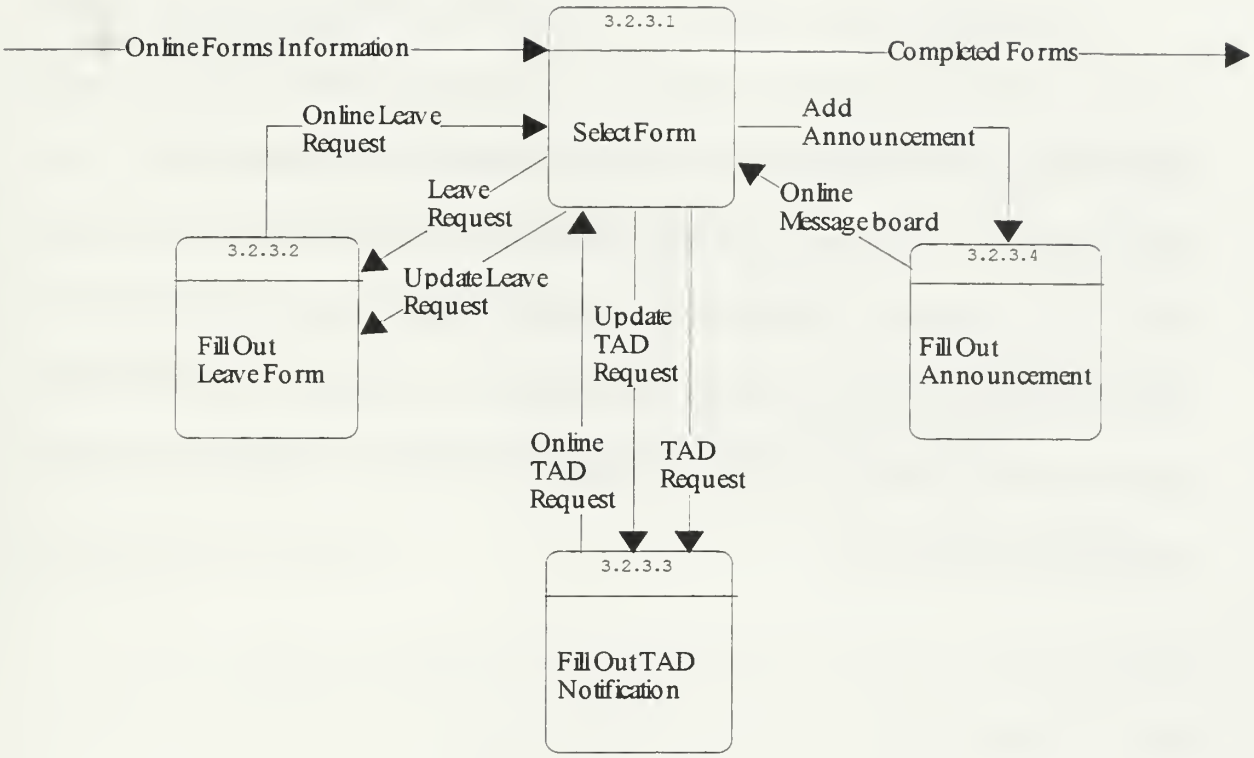


Figure 6.19 Level 3 DFD - Select Administrative Reports

The complexity of the new business model is overshadowed by the ease of access to all information. The use of the DFDs presented in this section illustrate that ESU business processes can be changed and improved. For this case, change is not made for the sake of change, but as an effective tool in obliterating old business practices to improve efficiency and command productivity.

The CASE tool used to design the DFDs for this thesis was Visible Analysts Workbench *Student Edition*, Version 6.0a. The symbol set used in the design of the DFD's was Gane & Sarson. The DFD's were decomposed to their lowest level and balanced.

E. CONCLUSION

This chapter provided a brief history of the database evolution and the knowledge required to understand data flow diagrams. The diagrams included within this chapter depicted a transition from individual processes under the current business model to a fully integrated intranet based process utilizing the business model developed as part of this thesis. Security aspects of the intranet were briefly described and will be presented in more detail in chapter 8, the conclusion of this thesis. As a reminder, all additional DFDs for processes not incorporated into the intranet are provided in Appendix B for future development considerations.

VII. INTRANET DESIGN

A. INTRODUCTION

This chapter will explain the importance of the graphical user interface and present various screenshots for the ESU Alameda intranet design specification. It will explain how the use of iterative database designs enabled a development that met the business models established in chapter six. Several screen shots are included to enable the reader to understand the uses of this rapid prototype development effort.

B. INTERFACE DESIGN

To this point the readers have been introduced to several potential intranet applications (chapter five), as well as analysis of pre and post intranet business models (chapter six). However, it should be understood that these applications would not enable the success of the proposed business models without the use of a well-defined graphical interface. For without the use of an interface that is easily navigated and intuitively understood, the users will reject the intranet concept and the new business model would fail. Therefore, the conceptual design of a robust graphical user interface became another primary design consideration for this project.

In defining the interface requirements and humanistic feel for the ESU Alameda intranet, the team evaluated several web sites known to distribute information. After researching several possibilities, the team was inspired through use of a proven commercial web site at http://my.excite.com, and decided to use this philosophy to pass

daily information within the ESU Alameda intranet. The team then placed emphasis in designing a user-friendly interface that maintained the following attributes:

- Utilizes a point and click interface
- Provided timely and informative information
- Consistent "Home Page" look and feel
- Speed when loading pages
- Simplicity and familiarity when navigating

This concept was achieved by starting all users on the intranet "home page" when they initially logged onto the intranet. At this location, the user is able to quickly assess the operational state of the command by merely glancing the descriptive hypertext titles on the screen. If detailed information were desired, it would be obtained by clicking on title. By composing the descriptive titles onto one page and forcing the users to start at this location, the command is guaranteed all users are exposed to the command's critical information each time the intranet is accessed.

The consistent look of the intranet was achieved by displaying the left frame at all times. This is made possible during the initial download of the intranet site where the left frame is stored in cache memory. By maintaining a consistent left frame, both download speed, simplicity, and familiarity are achieved. The consistent left frame also allows the user to select alternate applications within the intranet at any time. The right frame will display the newly selected information. This can be seen later in this chapter as various online forms are displayed where the left frame is static and the right frame is dynamic.

C. INTRANET SOLUTIONS

By analyzing the new business models in chapter six, along with some of the ideas used at http://my.excite.com web site, a baseline for the intranet's design can be seen. For example, the Data Flow Diagram in Figure 6.11 enabled the old business process to be transformed into the opening screen shot for the Intranet in Figure 7.1. This enabled the command at ESU Alameda to be able to retrieve important statistical facts at a moment's notice. This would create a new way of doing business, as the information would be virtually real time. Items of interest provided on the opening screen of the Intranet are:

- General announcements
- Leave Summary
- Personnel on Temporary Additional Duty (TAD)
- Plan of the Week

As mentioned in chapter 4, this project was developed conjointly as a three-member team1. This chapter highlights the Intranet solution with the emphasis being placed on the database solutions.

[1] LT Ralph Benhart and LT Dean Dardis comprised the Supply Tracking System team and developed this thesis using Microsoft Access for the specification development tool, while LT Todd Hannah comprised the Personnel Administration team and developed a separate thesis using Microsoft's Active Server Scripting as the specification development tool.

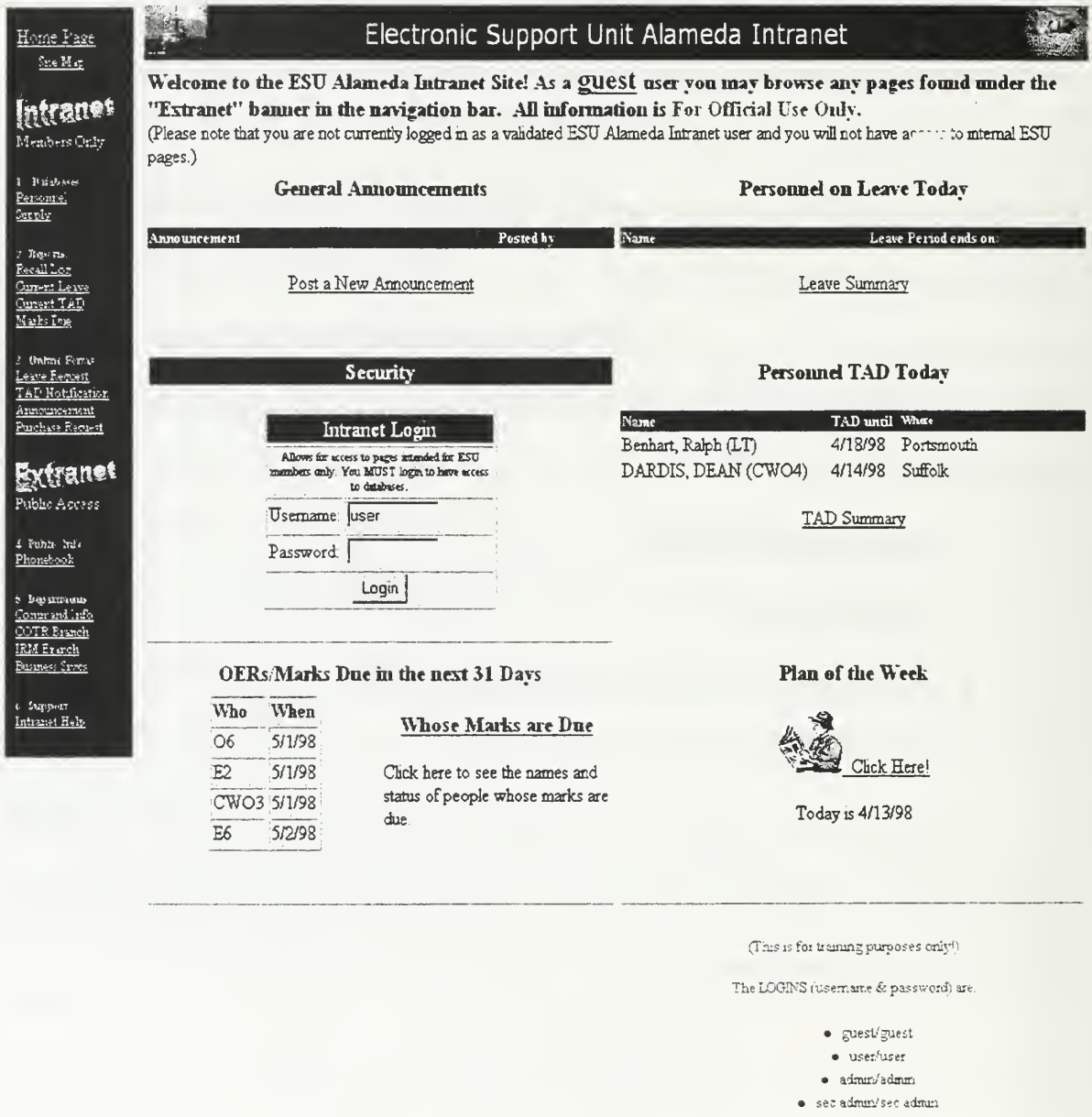


Figure 7.1 Intranet Opening Screen

To facilitate the use of the new supply and personnel tracking systems where responsibilities are pushed to the lowest level, several familiar forms must be introduced on the intranet. However, unlike the use of the old paper forms which required a large amount of Storekeeper or Administrative involvement, the new automated forms with pull down combination boxes will enable responsibilities to be pushed to the lowest level in the command. The required forms are as follows:

- Supply Procurement Request form
- Bill of Lading form
- Requisition Log (SURF Sheet),
- Leave Request form.

Figure 7.2 presents the online Leave Request form. By enabling the crewmembers of ESU Alameda to fill out Leave Request online, not only the member, but also the command is able to keep track of all personnel requesting leave. This leave form provides a central location to monitor the status of a request. This application abolishes the old slow and an ineffective practice of updating and tracking leave status and replaces it with an automatic and very efficient central repository.

This new form will aid in the tracking of leave requests as well as planning for future duty assignments at the unit. As the leave is submitted up the chain of command and approved or disapproved, emails are automatically forwarded to the person requesting the leave. This provides real time notification as to the status of the original request.

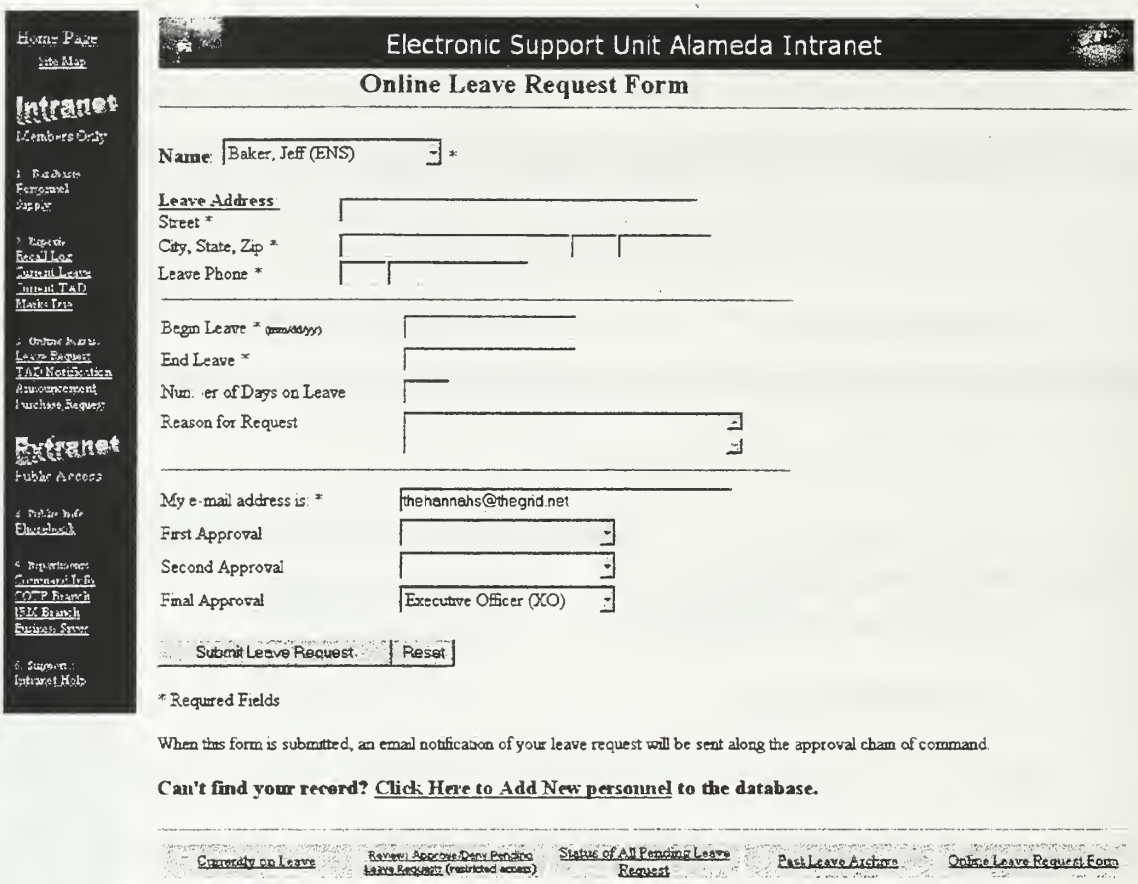


Figure 7.2 -Online Leave Request Form

If the user selected the Procurement Request form on the main page, Figure 7.1, the online Procurement Request form is displayed as shown in Figure 7.3. Utilizing this form a member can order a part online and maintain tracking until the part is delivered to its destination. Once the required data is filled out in Figure 7.3, the user mouse clicks on the "submit" bar at the bottom of the screen to enter the description of items that need to be ordered.

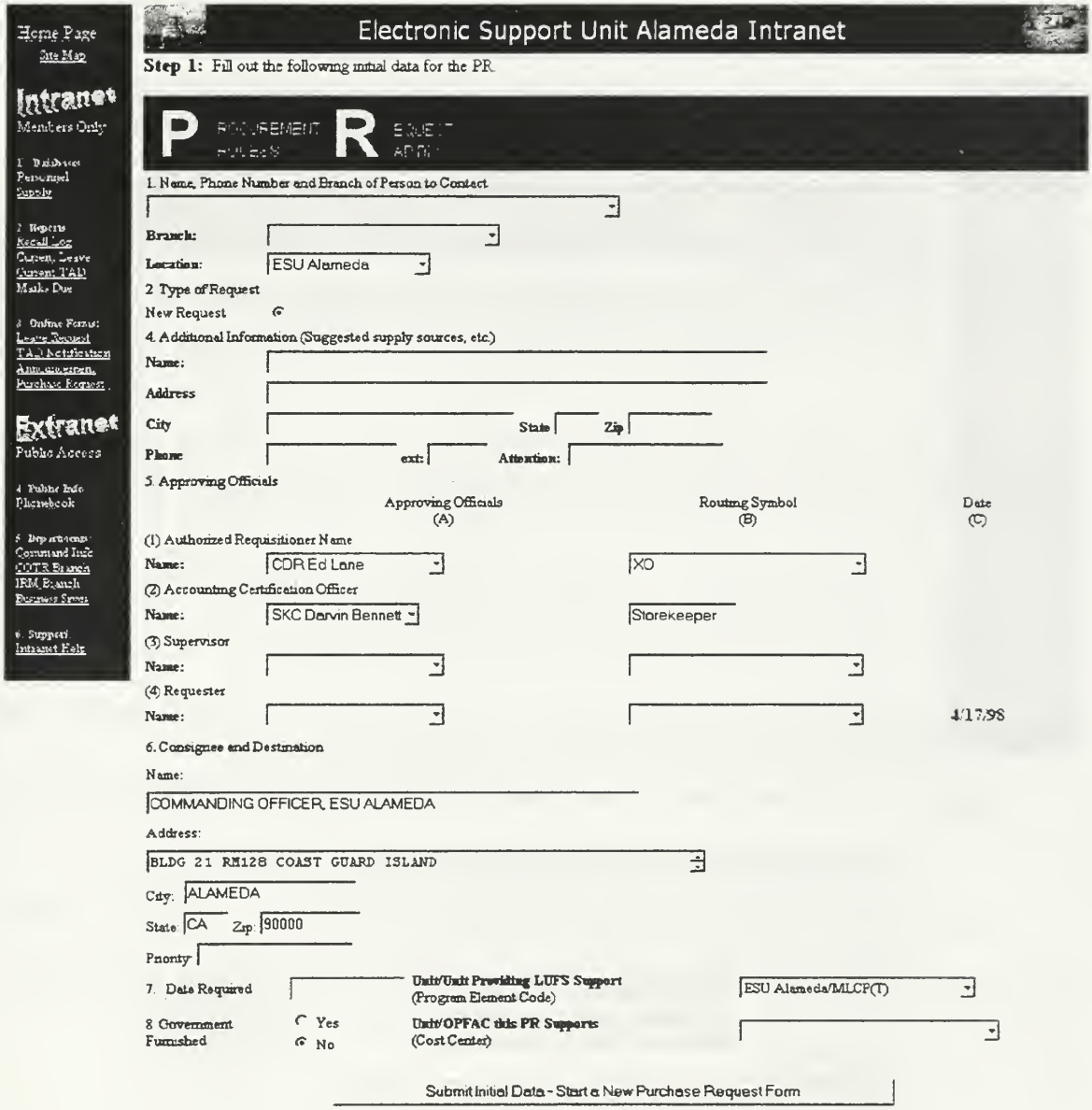


Figure 7.3 - Online Procurement Request Form

Figure 7.4 presents the online form for requesting supply parts that need to be ordered. If more than five items need to be ordered at one time additional forms may be pulled up from this screen.

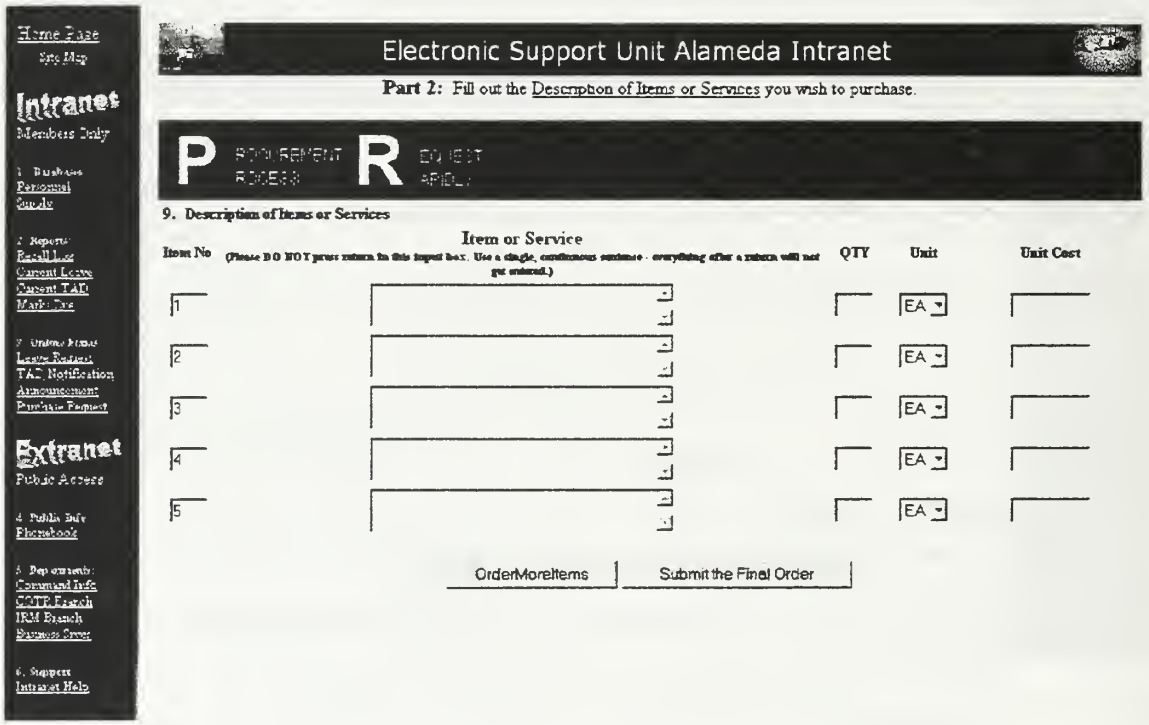


Figure 7.4 - Online Procurement Request Data Description Form

As previously mentioned the left frame remains consistent throughout each form allowing the user to access other areas of the Intranet as desired. Figure 7.4 portrays this logic.

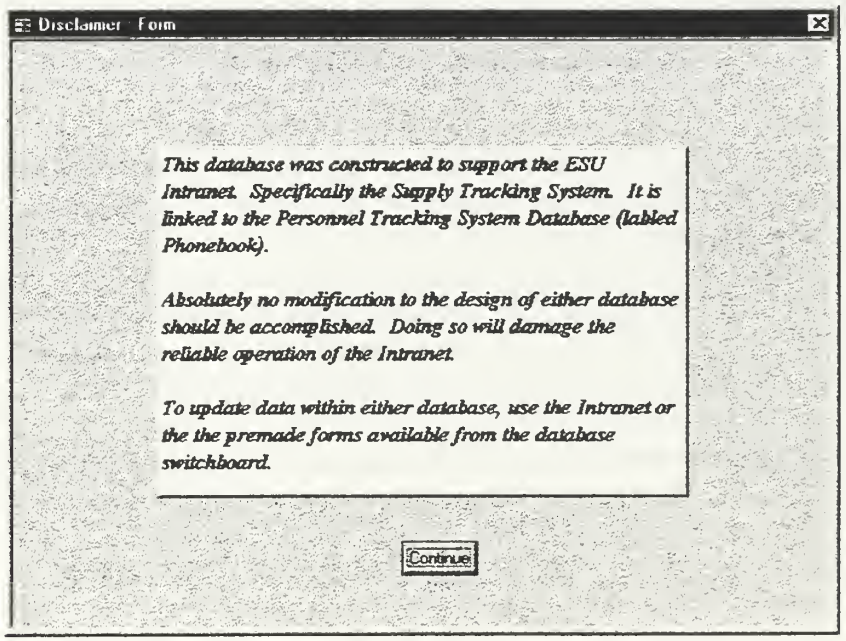
D. DATABASE

Although the tables used within the developed databases is part of the prototype intranet, the designed forms, quires and reports are not. In this case, these forms, queries,

and reports were used to test the proposed business process, ensure the functional use of the data was correct, and define the specifications for active server scripting by another thesis team working conjointly on this project. In addition, the database itself can be used to retrieve critical supply tracking data in the event the intranet fails to operate, offering a redundant system.

This section will illustrate the design of the Procurement Request (PR) form with the remaining Supply Tracking System forms placed in Appendix D. The screen shots that are presented are from forms created in Microsoft's Access 97.

Since the database tables are an integral part of the intranet, any unauthorized modifications to these tables could result in the failure of the intranet itself. For this reason, advanced features are used within Access 97 to hide the tables from the user. This does not however prevent the user from using the database as a redundant system. When a user attempt to load the database using Access 97 the first thing they will see is the opening disclaimer shown in Figure 7.5.



. Figure 7.5 - Database Disclaimer

Once the disclaimer has been read the user clicks on the Continue button to access the ESU Alameda Supply Tracking System. Figure 7.6 offers the user the choice of continuing on to the Forms and Status Updates, read the disclaimer again, or exit the database.

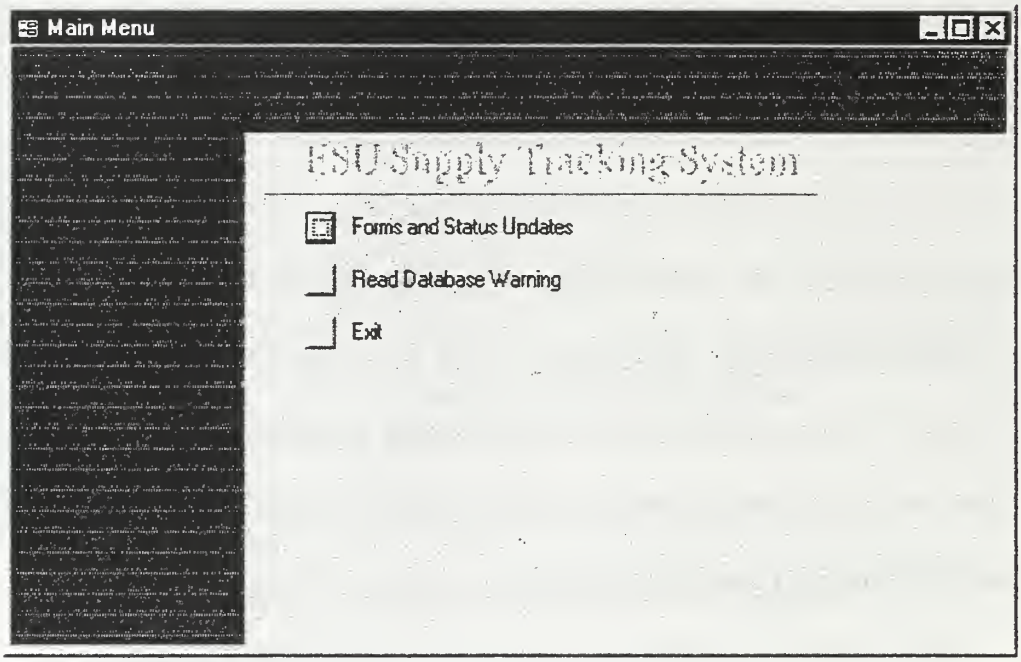


Figure 7.6 - Database Main Menu

Entering the Forms and Status Updates area the user is again provided with the four menu options. Figure 7.7 reveals the user's options.

The detail built into each of the following forms offers the ability to automatically receive tracking updates, search archived information, obtain status updates, and decentralize tracking responsibility to the lowest level. Embedding this functionality into

the look and feel of existing paper forms reduces the amount of training required and enhances the acceptance of the intranet as a business tool.

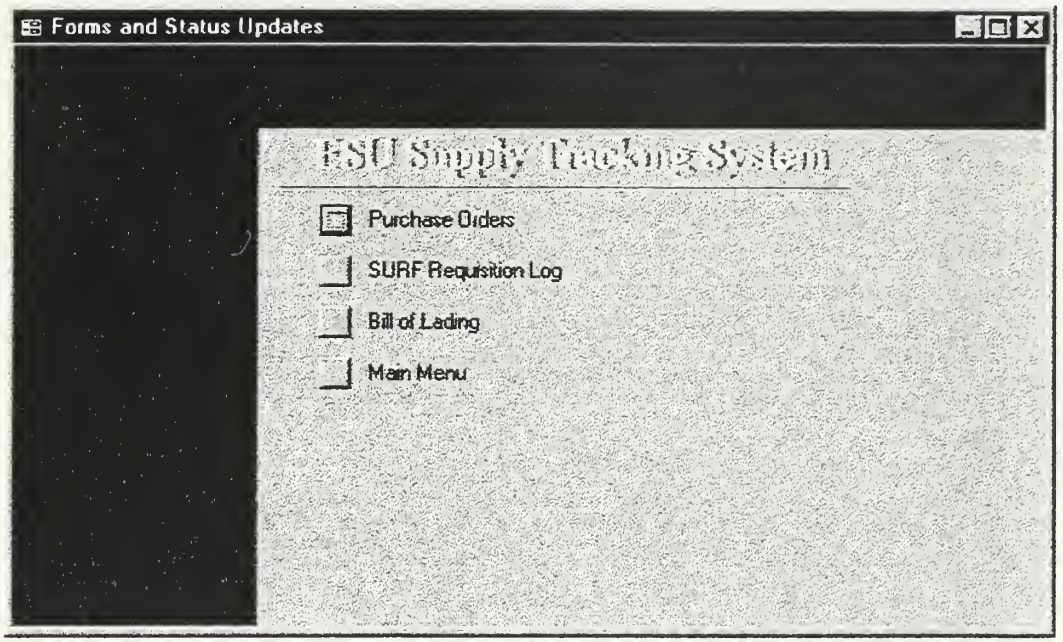


Figure 7.7 - Forms and Status Update Menu

Figure 7.8 shows the Procurement Request (PR) form. The PR number in the upper right hand corner of the form uniquely identifies each form. The parts ordered on each form could be tracked and/or changed based in this number.

Extensive use of drop-down boxes enabled the use of a knowledge base where users selected known information to input specialized supply codes which historically required extensive Storekeeper time to look up. In addition, the use of default values decreased the amount of time required to fill in recurring or look up unknown information. As shown in Figure 7.8, block 6 is a defaulted value. This default Command information will always be the same for Purchase Orders (PR's) originating from ESU Alameda. Many other blocks such as blocks 1, 2, and 5 contain drop-down

boxes with names and information for the authorized individual at the unit. This was to ensure accuracy of the data and reduce the time required in filling out the form.

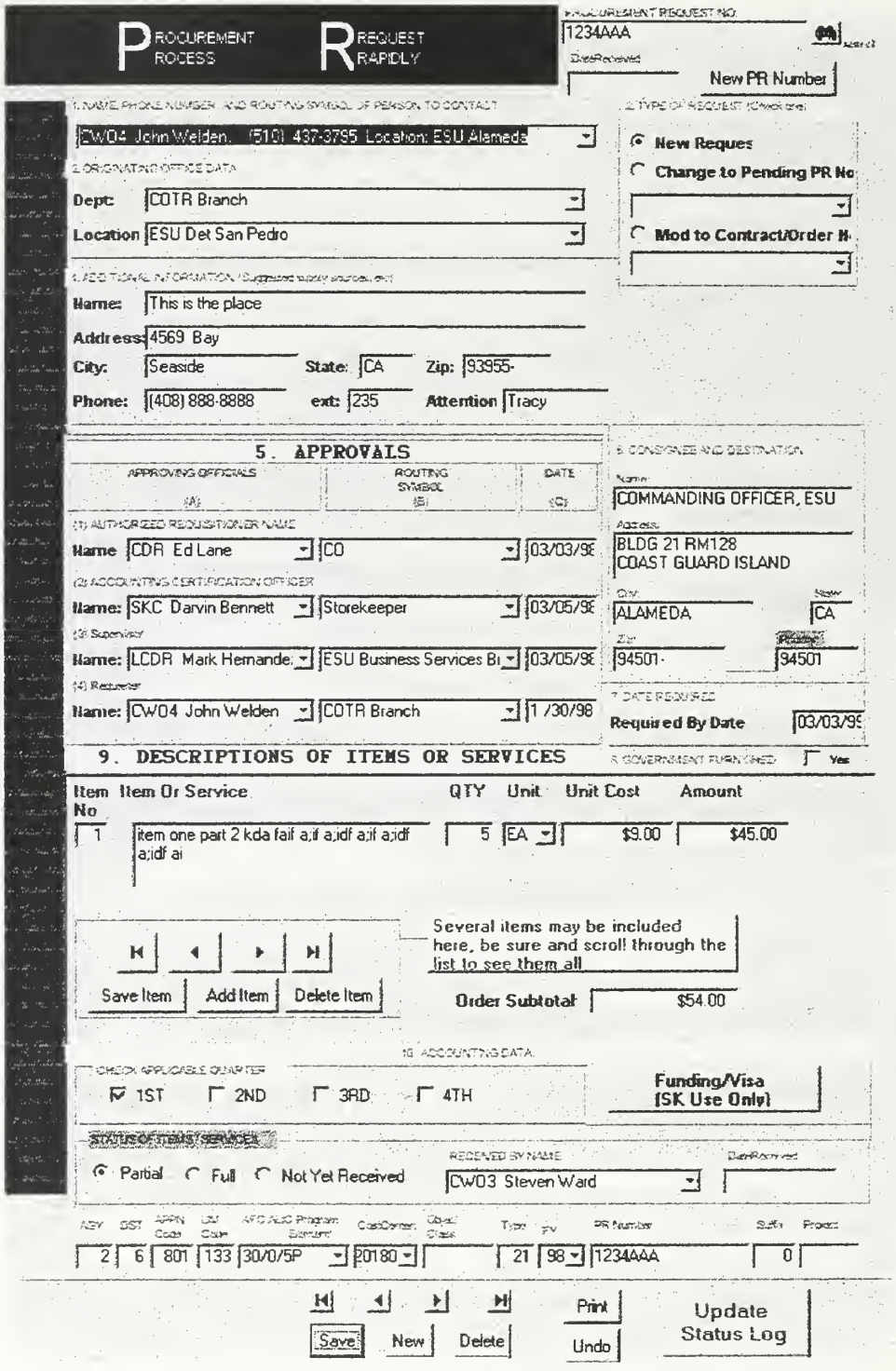


Figure 7.8 - Database Procurement Request Form

E. DATABASE UPDATE AND MAINTENANCE OF FORMS

Information provided within the database's drop-down boxes is dynamically changing as a result of such things as military transfers and changes in duty assignments. For these reasons, the design team added update functionality to the database to enable the user to quickly and easily update these forms with current information. Since each field in each form is associated with an update form, the user always has the ability to update missing or incorrect information quickly. To update the data in any drop-down box, all the user has to do is double-click the incorrect field with the left mouse button to bring up the needed form. Figure 7.9 shows such a form, in this case the unit of issue for parts would be used to add the "BG" symbol for bag.

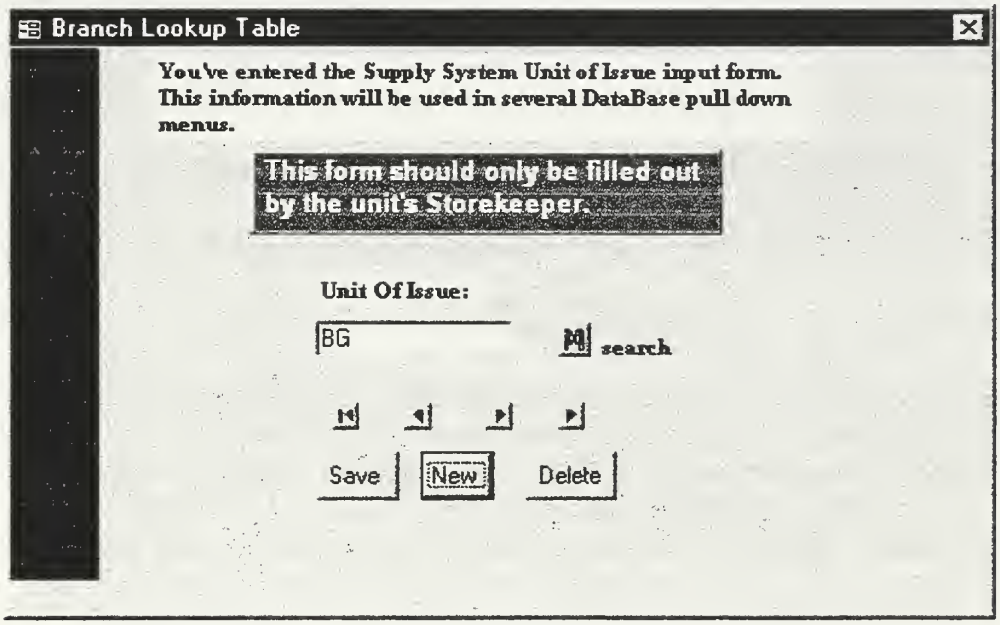


Figure 7.9 – Unit Of Issue Lookup Table Update Form

If a field already contains information in it, such as a default address, and a need exists to input different data, the user can enter the required data directly into the corresponding area. If the user attempts to call an update form by double clicking in the field utilizing the default value, the user will be told to input the data directly as shown in Figure 7.10.

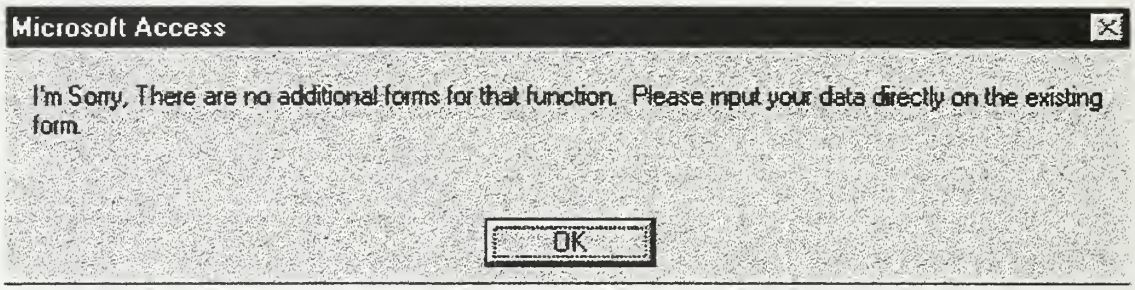


Figure 7.10 - Default Data Feedback

F. STATUS LOG

As previously mentioned, tracking the status of each part and providing updates to various crewmembers required over 25% of the Storekeepers time. It is primarily because the SK was the only person tracking the parts and continually repeating updates up and down the chain of command. Under the new business model, the responsibility to update parts falls to the division ordering the part. As updates are performed, they are now tracked through the use of a Status Log, a system that did not exist under the old business model. Figure 7.11 shows the Bill Of Lading Status Check form. This from is typical and used in the same way for the various types of supply forms. Each time a user obtains new information on a supply item, they will share this information with everyone in the command by logging it onto this form. By using this methodology, The database

will maintain current information as to when the part was originally ordered, shipped, and any incidental information received on the part before it arrives. Anyone seeking information on this part can access the log and review the part history without requiring the assistance of another person, which has historically been the Storekeeper. The log is closed out upon arrival of the part by placing a check mark in the received box on the form. To maintain accuracy and accountability of all input data, the user's name is entered each time a status update is accomplished.

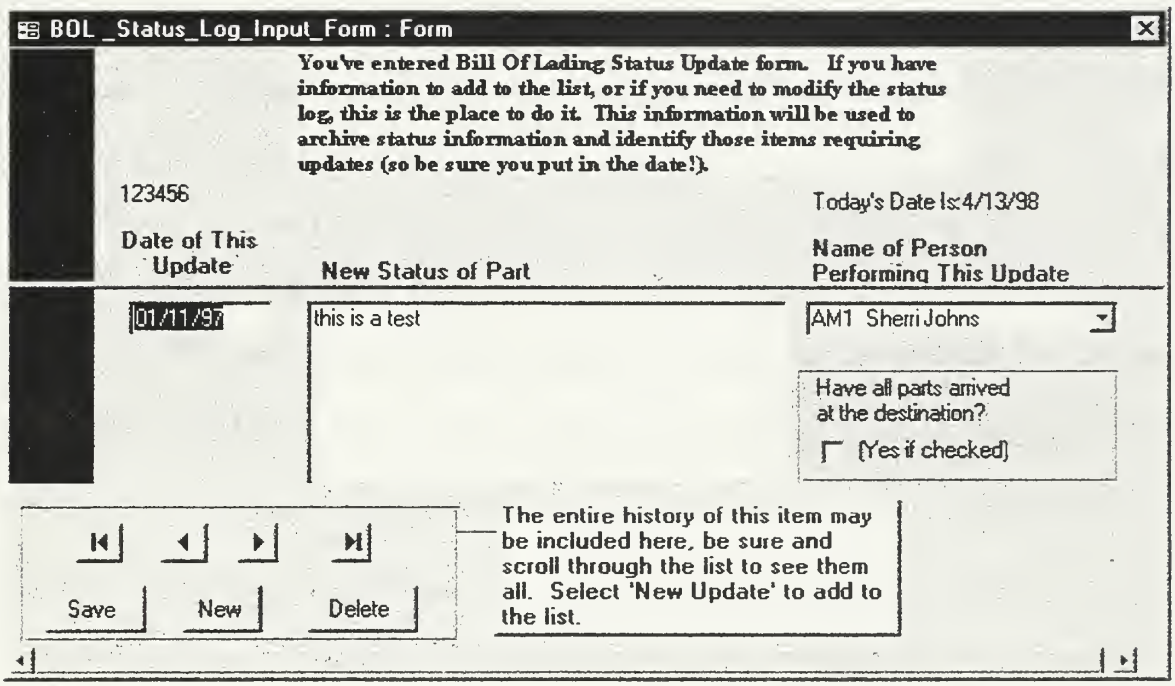


Figure 7.11 - Bill Of Lading Status Log Update Form

G. CONCLUSION

This chapter explained the importance of the graphical user interface and presented various screenshots of the ESU Alameda intranet design specification. It explained how the use of database designs enabled a development that met the business models established in chapter six and offered several screen shots to assist the reader in understanding the uses of this rapid prototype development effort. Although not all forms were incorporated onto the Intranet, the data modeling research was performed and is included in Appendix D for use in future development efforts.

VIII. CONCLUSION

A. INTRODUCTION

The amounts of business and technical research required for intranet development is extensive, and despite the vast amounts of data analysis accomplished within this thesis, there are many more facets which must be considered before an effective intranet can be employed at a government installation. Since the design and implementation phases of this project will be accomplished by a different thesis student jointly working on this project, discussions of such material will be left for presentation within that thesis. Nonetheless, a brief discussion of business policy, need for organizational learning, security, and lessons learned will be provided as the conclusion to this thesis.

B. BUSINESS POLICY

The effects of government downsizing, restructuring, and streamlining have placed many new challenges on ESU Alameda, with one of the largest being the management of available time. Although much thought has been put into the conceptual design of this prototype intranet, it does not guarantee successful results without the creation of a well established policy for intranet use. While creativity must be encouraged, the organization must not allow a paradox to exist where the publishing of artistic work becomes more important than the information itself. In other words, the policy must continually weigh the benefits of the intranet against the costs of its use and make policy adjustments for any area which fails to meet the original intent of application.

C. ORGANIZATIONAL LEARNING

The ESU command must recognize that the use of an intranet will create a technologically driven paradigm shift within the organization. Since this will be a new experience for the majority of the organization, it will therefore require some amount of organizational learning to be successful. Although some members will find the concept of intranet collaboration easy, others will have a difficult time adopting to this new way of business for various reasons. One reason this difficulty exists is found in the impeding mental models of the individual users. Depending on the extent of these mental models, individual users could unintentionally restrict system functionality and defeat the intrinsic purposes of the intranet. One reason this is true is because the mental model is tacit and exists below any level of user or command awareness. Therefore, it is highly recommended the command meet with small groups of users before implementing the intranet to examine the mental models of the organization and sell the concept of intranet use. Once the organization recognizes and challenges their own mental models, true organizational learning can begin. So simply put, even if a user is forced to comply with intranet use, the full advantages of the intranet will not be recognized until each user challenges their own mental models and enables uninhibited organizational learning.

D. SECURITY

Several different types of hardware and software security products exists to meet the operational requirements of ESU Alameda, many of which the organization may already be aware of in using the Microsoft Windows NT networking platform. Although it is not the intent of this thesis to forecast the future security requirements of ESU Alameda, or to choose the optimum mix of hardware and software products on the market to meet these requirements, we would like to introduce the reader to the types of common security measures available and briefly describe how ESU Alameda may use them if so desired. The common security measures include:

- Authentication
- Access Control
- Cryptography
- Firewalls
- System Integrity
- Auditing

1. Authentication

The function of the authentication process is to identify the user to the computer system by means of a password. For the computer system, this ensures the user is who they claim to be so proper access to restricted files can be managed. For the user, this prevents the need to sign into multiple systems local and remote systems, since the authentication process is only required once for each session. During the design of the intranet, at least four stages of generic authentication should be implemented for the following reasons:

a. Administrative, for overall administration of the intranet

b. Command, for signature control of the CO and XO

c. Supervisor, for signature control of division supervisors

d. User, for signature control of individual users.

Additional control could be implemented if each user was provided individual access privileges, however, this would create additional administrative maintenance issues which may not be warranted for ESU Alameda.

2. **Access Control**

The primary role of access control within each intranet application will be to enable signature authority and possibly viewing privileges based on the command position held within the organization. Since there exists little need to establish and manage a system for individual access control, a generic system could be used to minimize the administrative burden of the command. This is possible because there exists a since of trust within the ESU organization. For this reason, the combined use of authentication and access control will prevent the accidental authorization of intranet request by junior command members for such things as leave requests and supply budget authorization forms. It is this feature that will compare a users logged in authorization against the access control level associated with the various form sections within the intranet.

3. Cryptography

Cryptography is primarily used when sending sensitive data across an unsecured network. There are various types employed, with each offering a mechanism to scramble the data in a way that only the intended user can unscramble and read it. Since ESU

Alameda is not operating in a highly secure environment, the need for the additional functionality of cryptography above that already provided by commercially available free web browsers is not required.

4. **Firewalls**

The primary purpose of firewalls is to protect the safety of a site against malicious attack from personnel outside the organization. Since ESU Alameda should use an extranet to share information with customers, as well as allow internet access for employee research, the use of a firewall is highly suggested. Since there are numerous different types of firewalls, as well as pricing and maintenance considerations to consider, we suggest ESU Alameda hire a professional firewall provider to ensure the firewall is properly selected, initialized, tested, and maintained.

5. **System Integrity**

The need for integrity protection is similar to the need for cryptography. Any time data is sent across an unsecured network, there exist the possibility someone can read the data if it is not encrypted. A potentially worse case scenario would be if the data were altered and then sent to the intended person. By using one of the many types of integrity methods, each member possesses assurance that the data came unaltered from the person claimed. For similar reasons as cryptography, this functionality is already adequately provided for ESU Alameda within the web browsers and is not considered an additional requirement for intranet development.

6. **Auditing**

By enabling auditing an organization can log all attempts made to access the intranet or extranet system. In addition to tracking the number of unauthorized access attempts made to the system for security monitoring, the command could also measure the access to published data to see if the data published was worth the efforts to make it. Because ESU Alameda will be using Microsoft Windows NT Server, they already possess the ability to turn this feature on and off, and therefore do not require further development as part of the intranet design. Since the use of this feature has a negative impact on systems performance, it should only be enabled when a need exists, and then disabled at again at the first opportunity.

E. LESSONS LEARNED

This section provides the reader with some of the lessons learned while designing this project. It is primarily intended to assist future designers of such an application.

1. Need For Positive Designer And Customer Relations

We were extremely fortunate to find a customer who was extrinsically and intrinsically motivated to discuss new business opportunities. Because of the complexities and difficulties experienced with data analysis, this project would not have succeeded if not for the ongoing feedback the ESU crew provided. It is strongly recommended that only customers with this commitment be considered for business analysis considerations.

2. Need To Understand The Scope Of The Project

A project of this sort is a huge undertaking capable of quickly developing into a task much larger than anticipated or desired for the limited development time available. When starting such a project, recognize the following:

- Team members will differ in opinion, requiring additional research and rework of completed tasks. Although this is good for the design of the finished product, it took more time than anticipated and was a major factor in delays
- Product design goals will change much more than anticipated. Changes come from the unit as well as other team members. This has similar effects as the previous bullet and is another cause for unplanned delays.
- Team members become tunnel visioned. By definition of the rapid prototype development, the system is not designed to work. However, in retrospect we found we spent days fixing designs which previously worked, or which we couldn't get to work suitable for a finished product. More emphasis needs to be placed on rapid prototyping instead to prevent it from turning into the build and fix methodology.

3. Need For Skills Development

With more than 2000 pages of text read in preparation for this project, much more time was required to gain the needed skills than was anticipated. We suggest you quadruple the time allotted for this task.

4. **Software Bugs Or Restrictions Of Use**

Attempting to resolve software bugs and limitations of student edition CASE tools provided this team the largest amount of frustration for the entire project. Before starting such a project, preview applicable newsgroups and web sites to gain an understanding of the software constraints you will come across before you spend days trying to solve a problem that you can not fix.

5. Need For Patience And Pacing

In attempts to make up the lost time associated with software bugs, longer learning curves than anticipated, delays associated with reengineering efforts, and the teams intrinsic desire to resolve all encountered problems, team members began to get restless and began working abnormal hours in attempts to catch up. Fatigue made matters worse and eventually the perceived scope of the project was scaled back to an obtainable level, more in lines with the original projections. It is highly recommended that future teams taking on this type of project accept these delays and learn to use them as positive learning experiences instead of failures to meet obligations. We feel adjusting to these frustrations and enhancing team management skills to be one of the biggest lessons learned in this project.

F. CONCLUSION

Although the thesis analyzed the existing business models, data flows, and technical aspects required for intranet development, additional work will still be required by ESU Alameda to enable the organization to learn and accept the new policies and operating procedures. As a conclusion to this thesis, the reader was provided several types of security systems available for consideration as well as a list of our lessons learned to aide in future design capabilities.

APPENDIX A. TRIP REPORT

Subject: Initial visit to ESU Alameda, Alameda California, 4-7 December 1998

Team Members:	LT Benhart	NPS Student (USCG)
	LT Dardis	NPS Student (USCG)
	LT Hannah	NPS Student (USCG)

Purpose: Familiarization with ESU Alameda's functions, processes, challenges, goals, and requests for the development of a prototype Intranet specification.

People Contacted:	Dean Waring	ESU Coordinator (ESU's Boss)
	CDR Lane	CO
	LCDR Hernandez	XO
	LT Nelson	Computer Branch Chief
	LTJG Raush	Electronics Branch Chief
	CWO4 Weldon	Shore Section Supervisor
	CWO3 Ward	Telecommunications Section Supervisor
	CWO2 Olsen	Vessels Section Supervisor
	TCCS Clarke	Frequency Manager
	SKC Bennett	Storekeeper
	ETC Bartlett	Alternate Contracting Representative
	GS12 Gainer	Computer Support Section Supervisor
	GS12 Usher	Networks Section Supervisor
	GS11 Spiva	Contracting Representative
	GS9 Wallace	Telecommunications Manager

Upon arrival, LT Benhart, LT Dardis of the specification development team and LT Hannah of the applications development team conducted an initial briefing with the Commanding and Executive Officer. Points of topic included establishing the objectives of the project, limiting expectations of the unit, and providing background information on team members. The command provided the team with unit familiarization, command and control oversight, existing command challenges, current state of fluctuation relative to a streamlining initiative, political profile, existing stakeholders, and hardware/software

design constraints. Schedules were established for a more detailed interviews later in the day.

Due to limited available time the initial plan of the team was to collect specific requirements by interviewing top management, and to gather existing forms, applications, and written procedures to study data. Existing procedures and divisional challenges were to be determined by conducting group interviews with key workers and middle managers, then using questionnaires to collect specific process information from these members.

Constraints: ESU Alameda recently received new Pentium based computers which will be upgraded to a Microsoft Windows NT 4.0 and Office 97 networked platform. Since this hardware and software will be the supported standard for Coast Guard Units, it will be used for project development.

Lessons Learned: More time was required than anticipated to gather the required information. The use of questionnaires was a fruitless effort offering no benefit to this project. This is primarily because the employees did not fully understand what information the team wanted, felt they could not adequately transcribe their changing roles, and felt their processes were uniquely event driven each day. To work around this challenge, the team conducted a quick training session on the use of data flow diagrams (DFDs) and iteratively used this tool in a group environment to transcribe daily routines on large drawing boards. With the team acting as facilitators and transcribing the needed data during group conversations, detailed process evaluations were enabled.

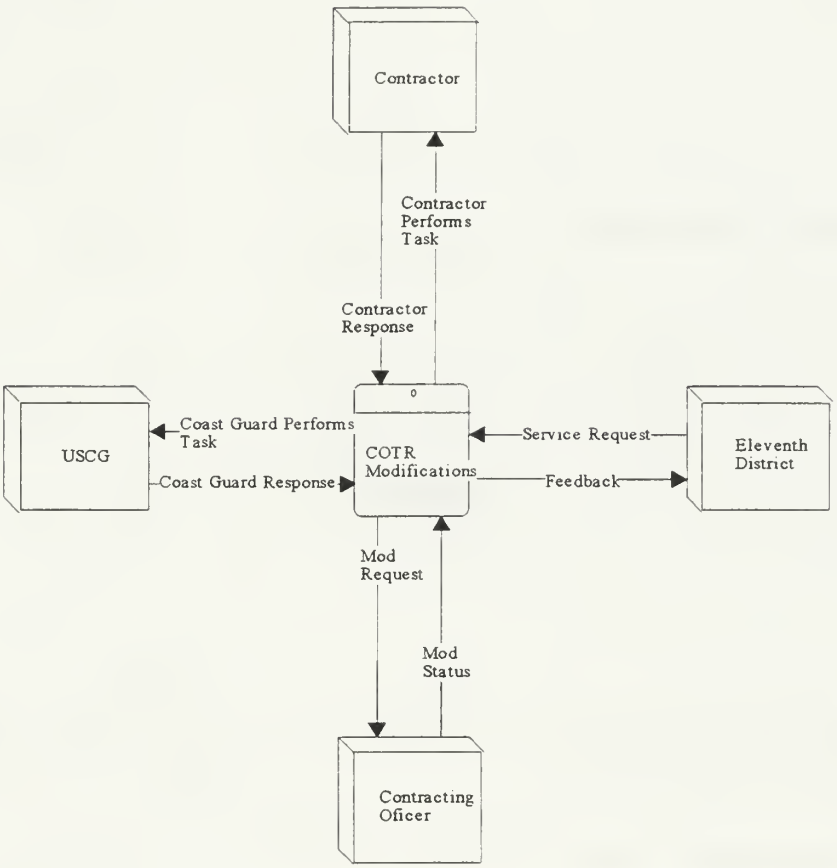
To assess project risk, a testing of the political environment was performed by discussing the concept of a prototype Intranet with all levels of the organization, as well as critical stakeholders external to the organization. No political problems were identified.

Conclusion: ESU Alameda is an innovative organization that could benefit from Intranet technology. The command is extremely willing to use new technologies, modify business processes, and take risks in attempts to enhance customer service. In addition, they are both intrinsically and extrinsically motivated to tackle the learning challenges of Intranet use.

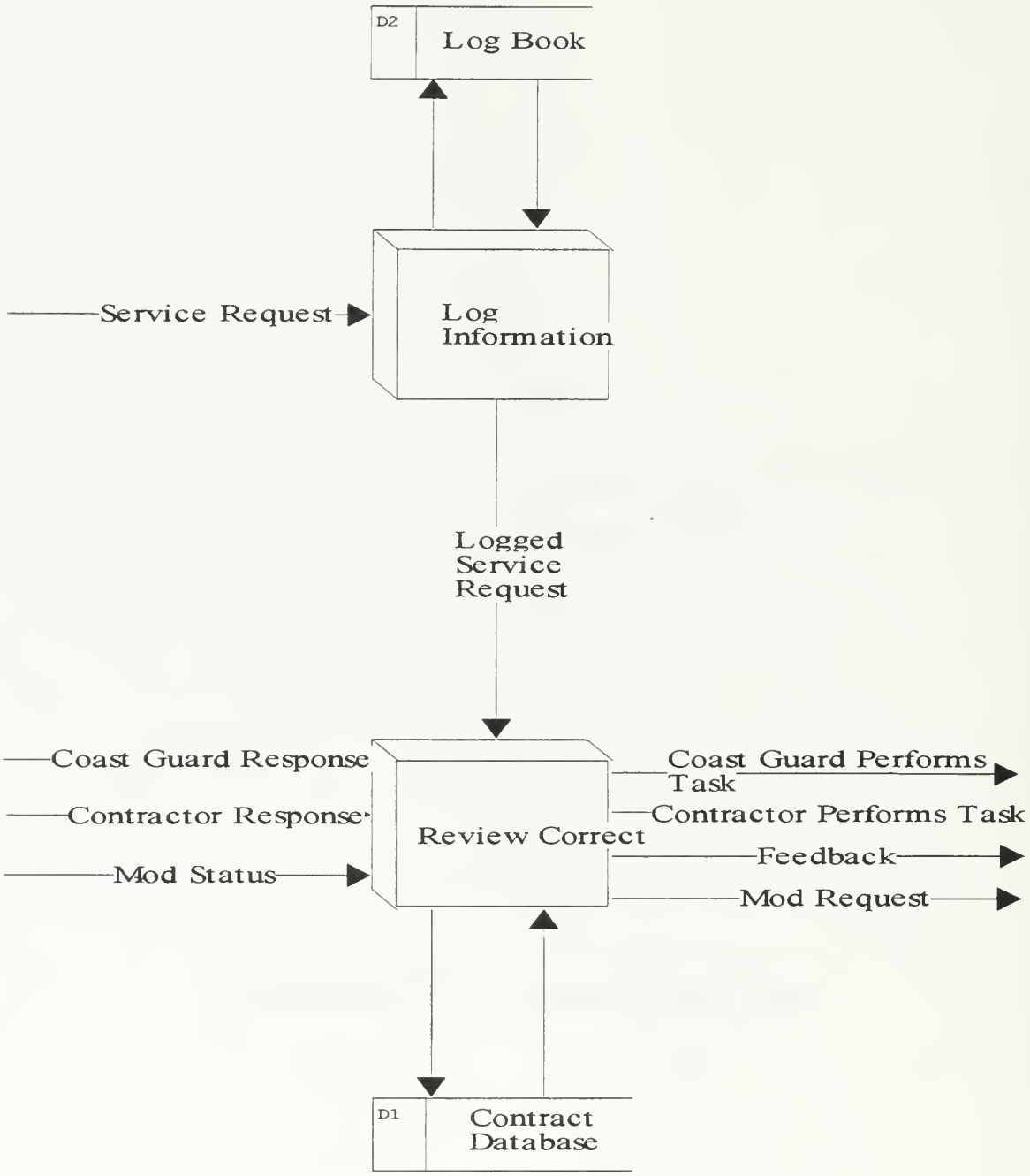
The teams obtained extensive information that must now be analyzed and refined. Open communications were established between team members and critical employees of the command for prototype feedback and data refinement.

The team would like to thank the crew of ESU Alameda for taking the time to assist them with this project. We hope we can all benefit from this experience.

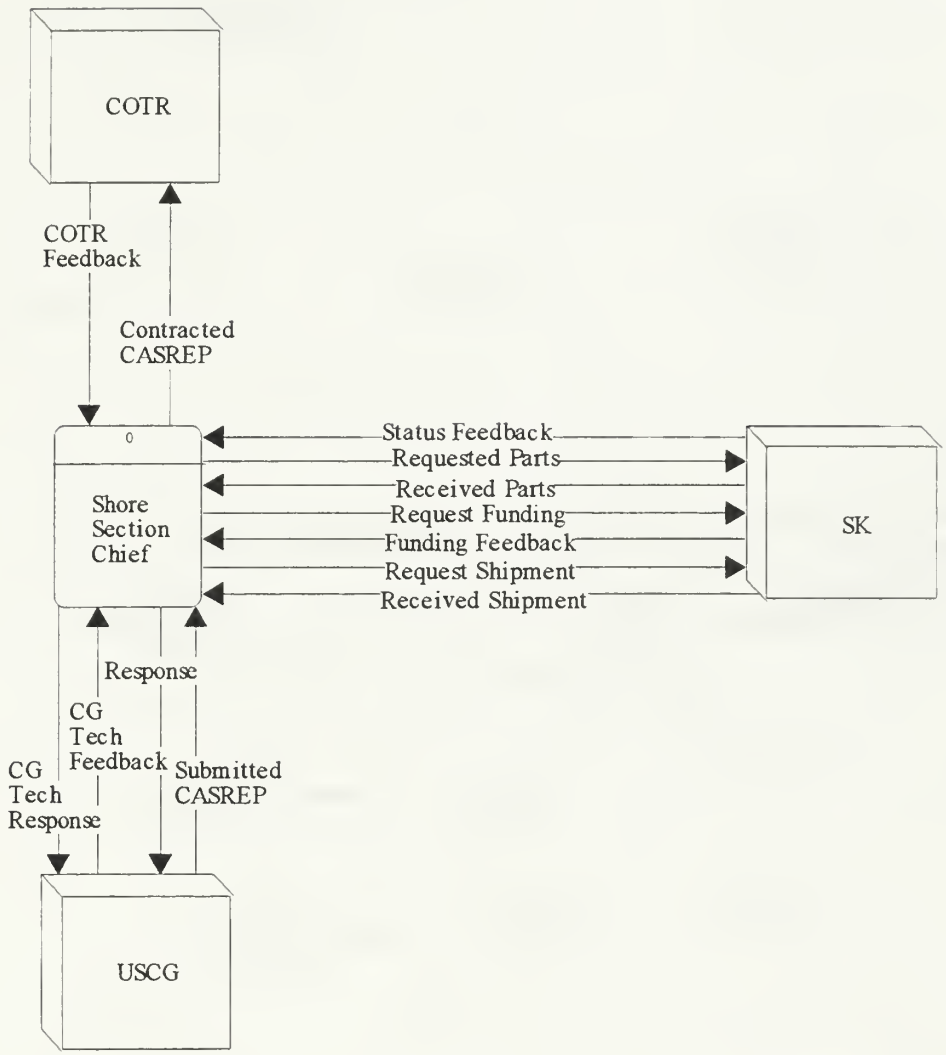
APPENDIX B DATA FLOW DIAGRAMS



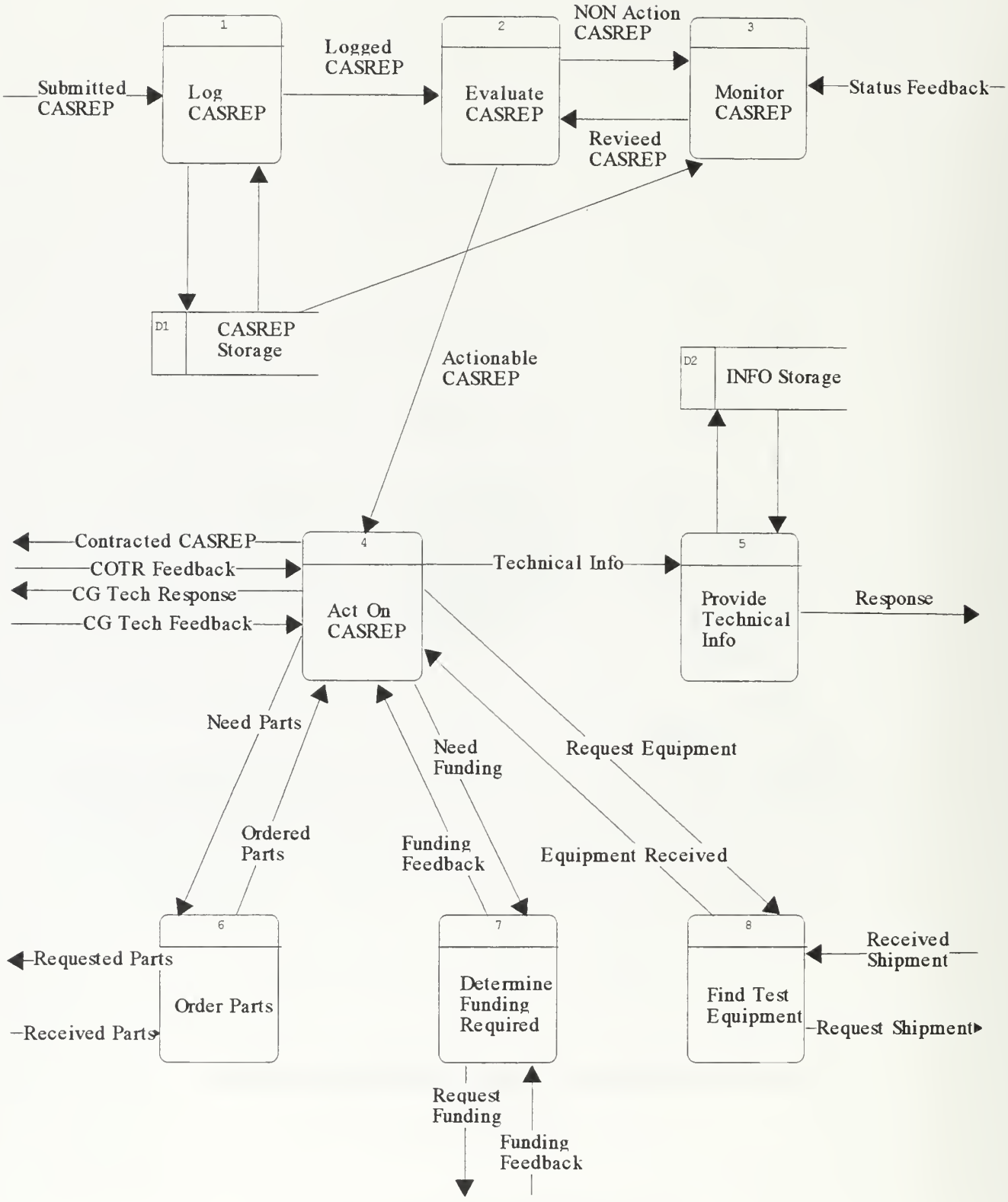
Context Level Diagram B.1- COTR Modifications



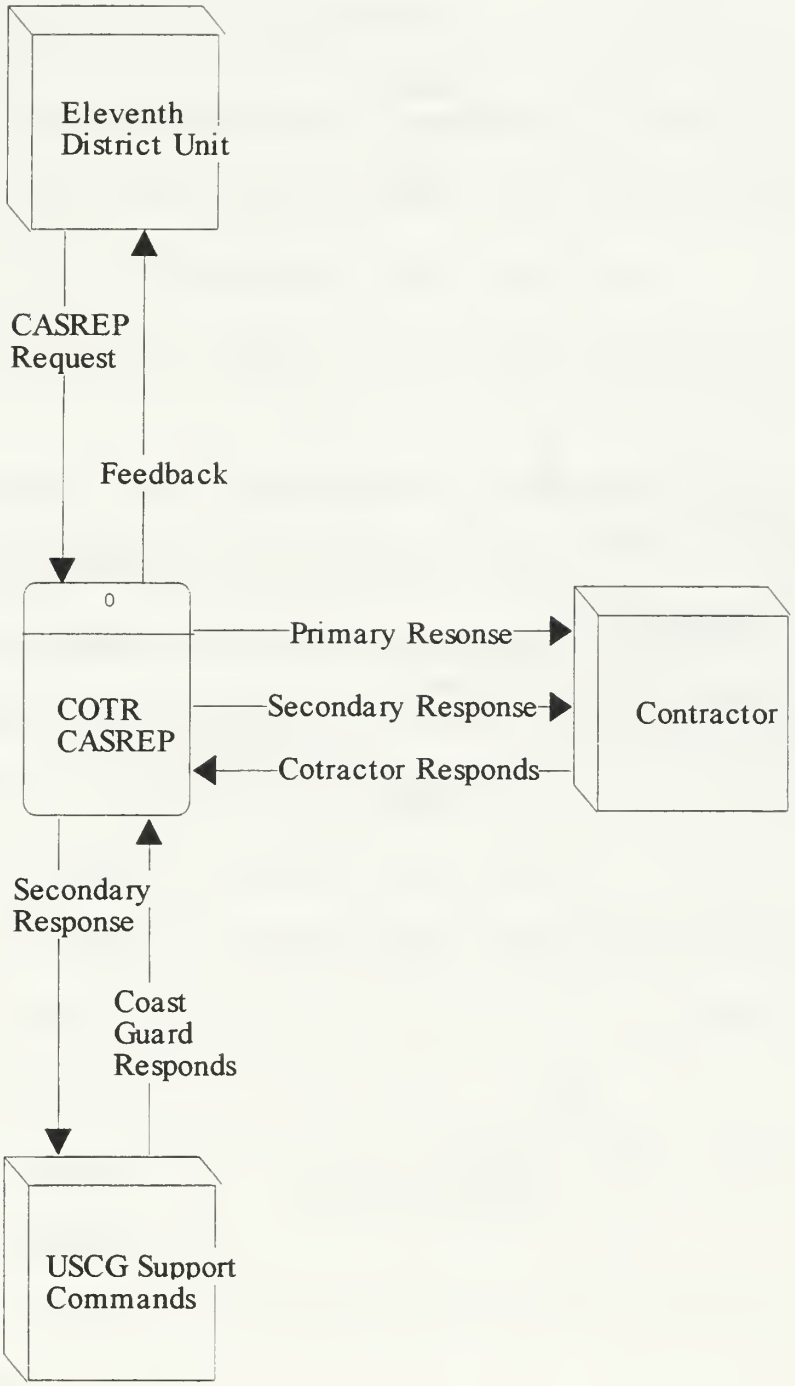
Level 0 Data Flow Diagram B.2 - COTR



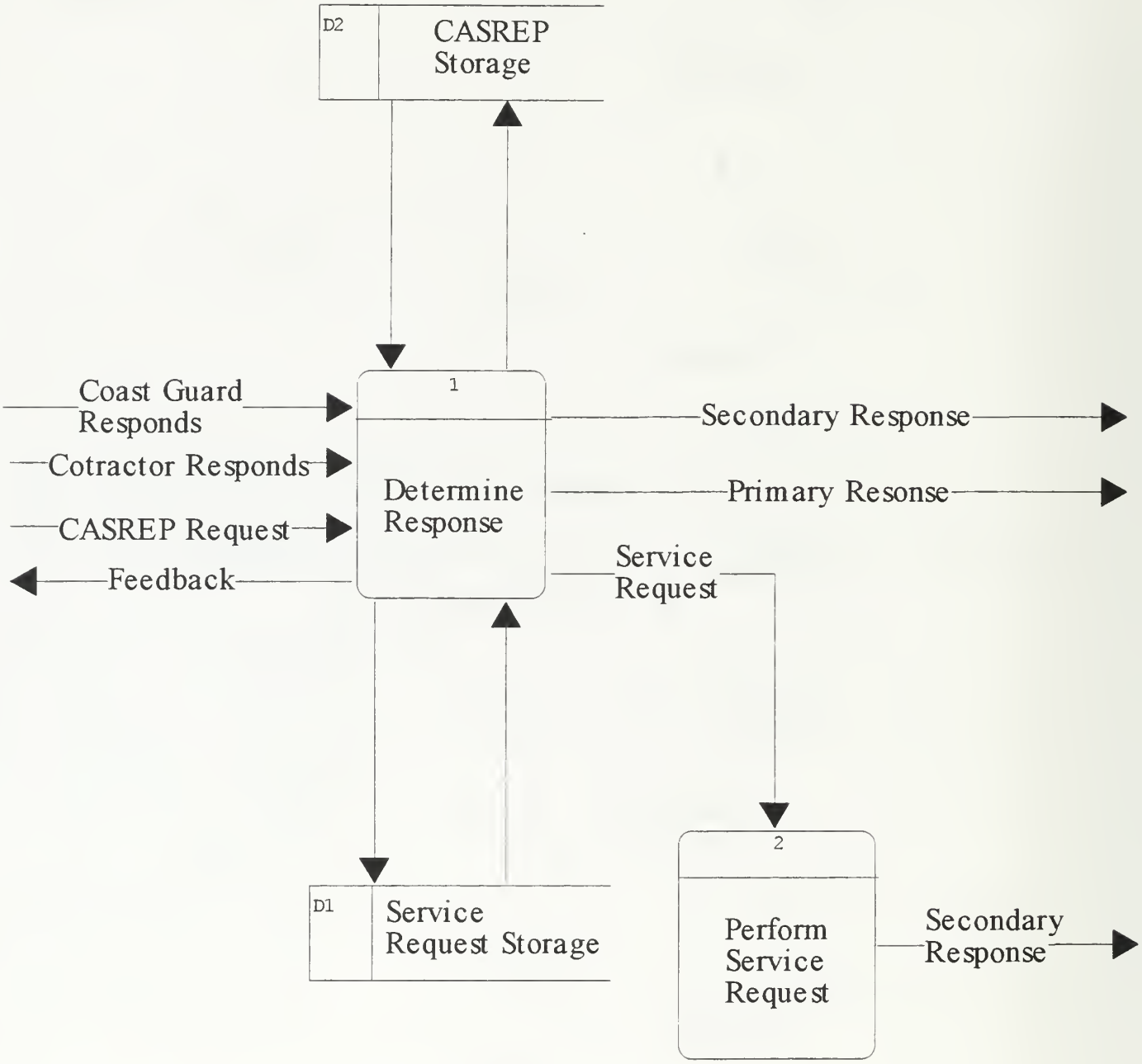
Context Level Diagram B.3 - Shore Section Chief CASREP



Level 0 Data Flow Diagram B.4 - Shore Section Chief CASREP



Context Level Diagram B.5 - COTR CASREP



Level 0 Data Flow Diagram B.6 - COTR CASREP

APPENDIX C PROCESS DESCRIPTIONS

LEAVE REQUEST

Context Level Diagram Description (Figure 6.6): The Leave Request process enables a person to request leave, and gain approval from immediate supervisors and finally the Executive Officer for final approval to take requested leave.

Process 1.0 Description (Figure 6.7): This process documents the request for leave.

1. **What entities does this process effect?** People requesting leave.
2. **How many users does this process have?** One.
3. **Who is the primary owner of this process?** Person requesting leave.
4. **How often is this process used?** On average, someone executes this process within the command several times each month.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries. Most requests come in the form of email.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive.
8. **What is the source of information for this process?** The person requesting leave initiates the process.

9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished by sending email to and from the supervisor, the supervisor's supervisor, and the Executive Officer until the request is either approved or denied.

LEAVE REQUEST

Process 2.0 Description (Figure 6.7): This process transfers the request from person to person with the email files acting as the archive for leave taken.

Process 2.1 Description (Figure 6.8): This determines the days of leave to request and fills out the leave form.

1. **What entities does this process effect?** People requesting leave.
2. **How many users does this process have?** Everyone at the command.
3. **Who is the primary owner of this process**? People requesting leave.
4. **How often is this process used?** On average, someone executes this process within the command several times each month.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive.
8. **What is the source of information for this process**? The person requesting leave initiates the process.
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually/mentally.

LEAVE REQUEST

Process 2.2 Description (Figure 6.8): This process initiates the email for leave request for the person requesting leave, immediate supervisor, additional supervisor, and finally the Executive Officer for final approval or denial.

1. **What entities does this process effect?** The people requesting leave, supervisors, and Executive Officer.
2. **How many users does this process have?** Everyone at the command.
3. **Who is the primary owner of this process?** The people submitting the leave.
4. **How often is this process used?** On average, someone executes this process within the command several times each month.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use** it? This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of information will be changed from day to day.
8. **What is the source of information for this process?** The person requesting leave initiates the process, everyone else reviews, comments, and forwards the request.
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished. Email is used.

LEAVE REQUEST

Process 2.3 Description (Figure 6.8): This process monitors the leave request in a waiting pattern for an answer.

1. **What entities does this process effect?** The people requesting leave, supervisors, and Executive Officer.
2. **How many users does this process have?** Everyone at the command.
3. **Who is the primary owner of this process?** People requesting leave.
4. **How often is this process used?** On average, someone executes this process within the command several times each month.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of information will be changed from day to day.
8. **What is the source of information for this process?** The person requesting leave waits for supervisor's input as well as final approval. Feedback in needed for the requesting person to know that the supervisor has forwarded the request without taking personnel time. The same process holds true once the supervisor(s) forward the request and wait for the decisions from the above chain of command.

9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is mentally accomplished by the initiator and all supervisors.

PARTS ORDERING

Context Level Diagram Description (Figure 6.9): The function of the Parts Ordering process is to act as focal point for all of the command parts request, including budget verification, quality control, ordering, tracking, forecasting, and transportation of materials. This process is the cornerstone to making the command operate efficiently and is the number one request of the command to attempt to resolve.

1. **Process 1.0 Description (Figure 6.10):** This process verifies all requests are in the proper format and are requesting proper quantities.
2. **What entities does this process effect?** ESU branch personnel.
3. **How many users does this process have?** All ESU employees (90-100).
4. **Who is the primary owner of this process?** The unit Storekeeper (SK).
5. **How often is this process used?** This process is executed several times per day.
6. **How often is this process updated?** Same as No.4.
7. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries. Most requests come in the form of email, message traffic, and forms.
8. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
9. **What is the source of information for this process?** The technician reports parts requirements and priorities.

10. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished. Updates are done in numerous ways including written logs and word processing, spreadsheets, and forms. All of this information is available, but will be difficult to pinpoint without a prototype design for Intranet use.
11. **Time Used:** Currently the unit SK spends 25% of his time informing command personnel on the status of parts orders.

PARTS ORDERING

Process 2.0 Description (Figure 6.10): This ensures adequate funds are available before parts are purchased, manually files paperwork to track finding, manually logs ordering details, and manually enters parts request in a proprietary parts ordering computer network system.

1. **What entities does this process effect?** ESU Executive Officer (XO) and ESU employees.
2. **How many users does this process have?** The SK is the sole performer of this task, but it is done for every member of the command.
3. **Who is the primary owner of this process?** The unit SK.
4. **How often is this process used?** This process is executed several times per day.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** The ESU branches will request the parts, the XO will authorize the funding, and the SK will provide all other input.

9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished.

PARTS ORDERING

Process 3.0 Description (Figure 6.10): This process determines the proper type of procurement for the requested part (Purchase Request, GBL, VISA, or MILSTRIP), and logs details into a log network system.

1. **What entities does this process effect?** Transport Office, Finance Office (F).
2. **How many users does this process have?** The SK is the sole performer of this task, but it is done for every member of the command.
3. **Who is the primary owner of this process?** The unit SK.
4. **How often is this process used?** This process is executed several times per day.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** A variety of United States Coast Guard regulations govern the proper ordering procedures.
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished.

PARTS ORDERING

Process 4.0 Description (Figure 6.10): This process determines which supplier the part(s) should be ordered from depending on the source of funding (VISA or MILSTRIP).

1. **What entities does this process effect?** Supplier.
2. **How many users does this process have?** The SK is the sole performer of these tasks, but it is done for every member of the command and for every part ordered.
3. **Who is the primary owner of this process?** The unit SK.
4. How often is this process used? This process is executed several times per day.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** A variety of United States Coast Guard regulations govern the proper ordering procedures.
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished.

PARTS ORDERING

Process 5.0 Description (Figure 6.10): This process performs a quality control check of received orders to ensure the proper type of part, quantity, and physical condition before transport to the requested location.

1. **What entities does this process effect?** Transport Office, ESU employees.
2. **How many users does this process have?** The SK is the sole performer of these tasks, but it is done for every member of the command.
3. **Who is the primary owner of this process?** The unit SK.
4. **How often is this process used?** This process is executed several times per day.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** A paper log and physical inspection.
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished.

PARTS ORDERING

Process 6.0 Description (Figure 6.10): This process manually fills out the MILSTRIP paperwork.

1. **What entities does this process effect?** None directly.
2. **How many users does this process have?** The SK is the sole performer of this task, but it is done for every member of the command each time a MILSTRIP part is requested.
3. **Who is the primary owner of this process?** The unit SK.
4. **How often is this process used?** This process is executed several times per day.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** The SK manually fills out this form for archival purposes.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** Parts catalogues and a variety of United States Coast Guard regulations govern the proper ordering procedures.
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished.

PARTS ORDERING

Process 7.0 Description (Figure 6.10): This process determines the proper type of procurement for the requested part (Purchase Request, GBL, VISA, or MILSTRIP), and logs details into a log.

1. **What entities does this process effect?** Transport Office, Finance Office (F).
2. **How many users does this process have?** The SK is the sole performer of this task, but it is done for every member of the command.
3. **Who is the primary owner of this process?** The unit SK.
4. **How often is this process used?** This process is executed several times per day.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** A variety of United States Coast Guard regulations govern the proper ordering procedures.
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished.

PARTS ORDERING

Process 8.0 Description (Figure 6.10): This process occupies 25% of the SK's time and verifies/monitors the status of all open parts orders, providing feedback to the appropriate entities.

1. **What entities does this process effect?** Transport Office, ESU employees, Supplier
2. **How many users does this process have?** The SK is the sole performer of these tasks, but it is done for every member of the command for every part that is ordered.
3. **Who is the primary owner of this process?** The unit SK.
4. **How often is this process used?** This process is executed several times per day.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries, mainly by phone, email, and in person.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day, but occupies a large part of the SK's duties.

8. **What is the source of information for this process?** The sources of information are extremely large, including shippers, vendors, sources of supply, and other military sources.
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished. This is the top area requested for development that would help free up some of the time spent updating personnel.

COTR MODIFICATIONS

Context Level Diagram Description (Figure Appendix B.1): The function of the ESU COTR as it pertains to contract Modifications is to act as an intermediary between Coast guard commands (Operational and Maintenance) and the additional services requested under a service contract. This function legally protects the government and ensures the contractor is paid or penalized for services rendered under the scope of the contract. Since only the Contracting Officer can make changes to the contract, The COTR will lobby all requests and make recommendations to the Contracting Officer for contract modification.

1. **Process 1.0 Description (Figure Appendix B.2):** This process logs all service requests for services outside the scope of the existing contract.
2. **What entities does this process effect?** USCG Eleventh District operational units, USCG Support Commands, Contractors, Contracting Officer.
3. **How many users does this process have?** The ESU COTR staff performs this process (less than ten).
4. **Who is the primary owner of this process?** The COTR.
5. **How often is this process used?** This process is executed on a weekly basis, and sometimes more frequently.
6. **How often is this process updated?** Same as No.4.
7. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries. Most requests come in the form of letters, messages, phone calls, and email.

8. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
9. **What is the source of information for this process?** The operational units are responsible for reporting operational service requirements, as their operational needs change.
10. **What is the current status of this process?** This process is currently not in use on the ESU Intranet and is manually accomplished. Updates are done in numerous ways including written logs and word processing. All of this information is not directly available and is a complex web of resources involving information controlled by outside entities, mainly being the Contracting Officer assigned to a different organization than the ESU.

COTR MODIFICATIONS

Process 2.0 Description (Figure Appendix B.2): This process logs all service requests for services outside the scope of the existing contract.

1. **What entities does this process effect?** USCG Eleventh District operational units, USCG Support Commands, Contractors, Contracting Officer.
2. **How many users does this process have?** The ESU maintenance personnel perform this process.
3. **Who is the primary owner of this process?** The COTR.
4. **How often is this process used?** This process is executed on a weekly basis, and sometimes more frequently.
5. **How often is this process updated?** Same as No.4
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** The COTR will determine if a need exists for immediate service request and whether it should be forwarded as a request for permanent contract modification.

SHORE SECTION (CASREPS)

Context Level Diagram Description (Figure Appendix B.3): The function of the Shore Section Chief in regards to CASREP response is to quickly resolve the problem. This can be done by using Coast Guard members who work directly for him, or with other ESU branches to gain contract assistance.

Process 1.0 Description (Figure Appendix B.4): This process logs all submitted CASREPS with the AOR of the Shore Section Chief for archival purpose.

1. **What entities does this process effect?** ESU branch personnel within the AOR of the Shore Section Chief (i.e. they work for him).
2. **How many users does this process have?** All ESU Shore Section employees.
3. **Who is the primary owner of this process?** The Shore Section Chief.
4. **How often is this process used?** This process is executed several times per day.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries. Most requests come in the form of email and phone calls.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.

8. **What is the source of information for this process?** The ESU Shore Section member performing the service desk duty function for that day (service desk duty revolves on a weekly basis).
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished. Updates are done in numerous ways including written logs, forms, and self-made databases. All of this information is available, but will be difficult to pinpoint without a prototype design for Intranet use.

SHORE SECTION (CASREPS)

Process 2.0 Description (Figure Appendix B.4): This process determines the priority of response and actions to be taken for a given CASREP.

1. **What entities does this process effect?** Indirectly the unit with the problem.
2. **How many users does this process have?** The Shore Section Chief is the primary user of this process, although his crew often reviews it for work details.
3. **Who is the primary owner of this process?** The Shore Section Chief.
4. **How often is this process used?** This process is executed several times per day.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** The input from the source of the CASREP that is stored in a service log by a service desk employee. The priority is determined by information known to the Shore Section Chief that is not documented anywhere (i.e. importance of outage relative to other outages).

9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually/mentally accomplished.

SHORE SECTION (CASREPS)

Process 3.0 Description (Figure Appendix B.4): This process monitors all open CASREPs and revises priorities as needed.

1. **What entities does this process effect?** Indirectly the ESU employees and unit with the problem.
2. **How many users does this process have?** The Shore Section Chief is the primary user of this process, although his crew often reviews it for work details.
3. **Who is the primary owner of this process?** The Shore Section Chief.
4. **How often is this process used?** This process is executed daily.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** The ESU service desk receives requests for changes and updates the CASREPs Storage Log. The Shore Section Chief only reviews the CASREP Storage Log to monitor status.

9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished. A self made database is used.

SHORE SECTION (CASREPS)

Process 4.0 Description (Figure Appendix B.4): This process determines what type of action should be accomplished to resolve the casualty.

1. **What entities does this process effect?** ESU COTR, Eleventh District Unit with CASREP.
2. **How many users does this process have?** The Shore Section employees perform this task for every CASREP that is submitted for repair.
3. **Who is the primary owner of this process?** The Shore Section Chief.
4. **How often is this process used?** This process is executed several times a day.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** The priority established by the Shore Section Chief and current funding and parts constraints.
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is mentally accomplished by the responding technicians.

SHORE SECTION (CASREPS)

Process 5.0 Description (Figure Appendix B.4): This process performs an archival of technical information to attempt to provide some source of a knowledge base for technicians.

1. **What entities does this process effect?** Indirectly, all entities that are supported by the ESU.
2. **How many users does this process have?** All members of the Shore Section as well as the COTR.
3. **Who is the primary owner of this process?** The Shore Section Chief.
4. **How often is this process used?** This process is executed daily.
5. **How often is this process updated?** Same as No.4.
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** Technicians.
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished.

SHORE SECTION (CASREPS)

Process 6.0 Description (Figure Appendix B.4): This process determines which parts are required for order.

1. **What entities does this process effect?** None directly.
2. **How many users does this process have?** All ESU Shore Section employees.
3. **Who is the primary owner of this process?** The Shore Section Chief.
4. **How often is this process used?** This process is executed daily.
5. **How often is this process updated?** Same as No.4
6. **What is the mode of use for this process by the entities that use it?** Forms and technical publications.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** Parts catalogues and a variety of Coast Guard regulations govern the proper ordering procedures.
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished.

SHORE SECTION (CASREPS)

Process 7.0 Description (Figure Appendix B.4): This process determines funding requirements to resolve a CASREP and request funding as they are needed.

1. **What entities does this process effect?** The unit with the CASREP, the ESU SK, and the ESU XO.
2. **How many users does this process have?** All ESU Shore Section employees.
3. **Who is the primary owner of this process?** The Shore Section Chief.
4. **How often is this process used?** This process is executed daily.
5. **How often is this process updated?** Same as No.4
6. **What is the mode of use for this process by the entities that use it?** This process is manually performed with email being the prime source of communications.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** A variety of Coast Guard regulations govern the proper ordering procedures and funding guidelines.
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished.

SHORE SECTION (CASREPS)

Process 8.0 Description (Figure Appendix B.4): This process identifies alternate sources of test equipment needed to resolve CASREPs when otherwise not available.

1. **What entities does this process effect?** Transport Office, ESU SK.
2. **How many users does this process have?** All Shore Section employees.
3. **Who is the primary owner of this process?** The Shore Section Chief.
4. **How often is this process used?** This process is executed weekly.
5. **How often is this process updated?** Same as No.4
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive.
8. **What is the source of information for this process?** The sources of information are extremely large, including shippers, vendors, sources of supply, and other military sources.
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished.

COTR CASREP

Context Level Diagram Description (Figure Appendix B.5): The function of the ESU COTR as it pertains to CASREP response and service requests is to act as an intermediary between Coast Guard commands (operational and maintenance) and the contractor chosen to perform certain contracted duties. This function legally protects the government and ensures the contractor is paid or penalized for services rendered under the scope of the contract.

Process 1.0 Description (Figure Appendix B.6): This process decides whether a request for maintenance falls under the contract for contractor resolution or under Coast Guard maintenance responsibility. The selected source of maintenance is then told to perform a function to resolve the maintenance casualty. Feedback amongst entities is exchanged for updating purposes. For some functions the contract will have primary responsibility with Coast Guard military members acting as secondary response source if the contractor is unable to respond. The opposite applies to areas involving the Coast guard as the primary maintenance source, where payment for extraneous contractor services is paid under the guidelines of the contract. All information is archived in a data store for monthly review to determine modifications required for contractor payments.

1. **What entities does this process effect?** USCG Eleventh District operational units, USCG support commands, the contractor.
2. **How many users does this process have?** The ESU COTR staff performs this process (less than ten).

3. **Who is the primary owner of this process?** COTR.
4. **How often is this process used?** This process is executed on a daily basis, sometimes more frequently. As the status of electronic repair changes, the members will report that information to the process.
5. **How often is this process updated?** Same as No.4
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** The operational units are responsible for reporting equipment casualties and operational conditions as it changes. The Coast Guard maintenance and contractor staffs report repair efforts and response capabilities. The maintenance contract is used to determine response guidelines.
9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished. Updates are done in numerous ways including written logs, word processing, spreadsheets, and some databases. All of the information is not directly available and is a complex web of resources.

COTR CASREP

Process 2.0 Description (Figure Appendix B.6): This process allocates Coast Guard maintenance personnel with the ESU to act as a secondary response team to contracted services as required to meet operational needs.

1. **What entities does this process effect?** USCG Eleventh District operational units, USCG support commands, the contractor.
2. **How many users does this process have?** The ESU maintenance personnel perform this process.
3. **Who is the primary owner of this process?** COTR.
4. **How often is this process used?** This process is executed on a daily basis, sometimes more frequently. As the status of electronic repair changes, the members will report that information to the process.
5. **How often is this process updated?** Same as No.4
6. **What is the mode of use for this process by the entities that use it?** This process uses multiple updates and multiple queries.
7. **What type of information does this process use?** Most of this information is unclassified but sensitive. The volume of traffic will change from day to day.
8. **What is the source of information for this process?** The COTR will determine if a need exists for a secondary response service request.

9. **What is the current status of the process?** This process is currently not on the ESU Intranet and is manually accomplished. Updates are done in numerous ways including written logs, word processing, spreadsheets, and some databases. Phones are mainly used to disseminate information.

APPENDIX D DATABASE FORMS

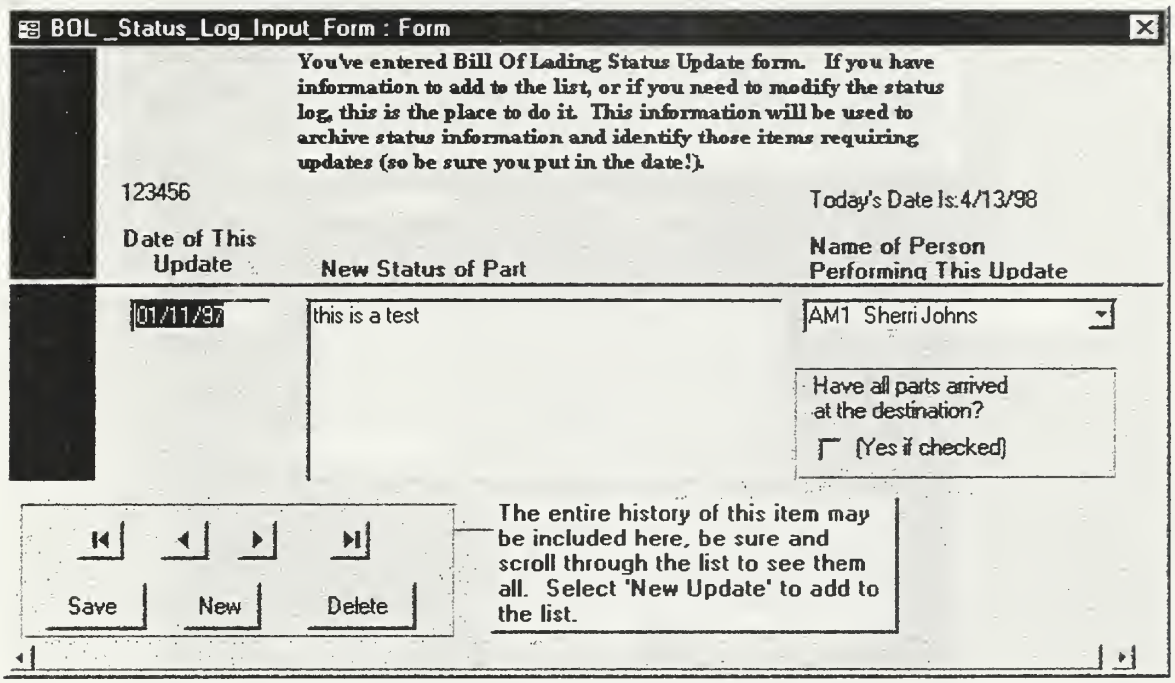


Figure D.1 - Bill Of Lading Status Log

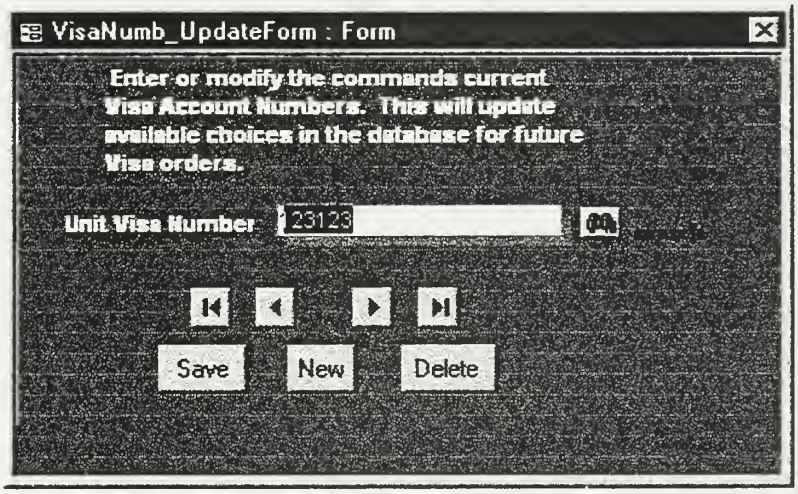


Figure D.2 - Visa Number Update Form

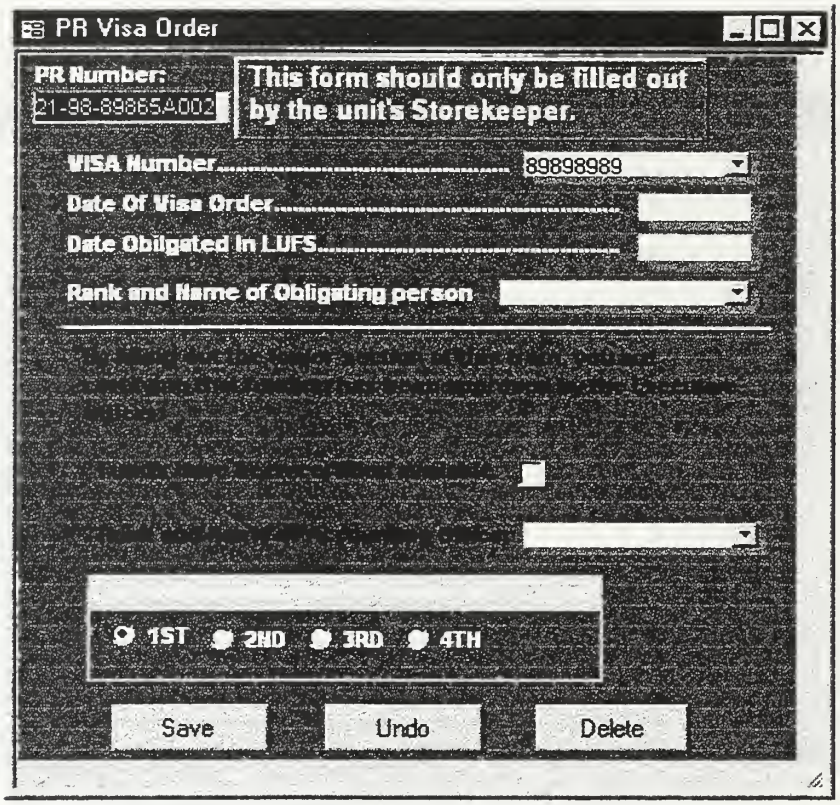


Figure D.3 - Purchase Request Visa Order Form

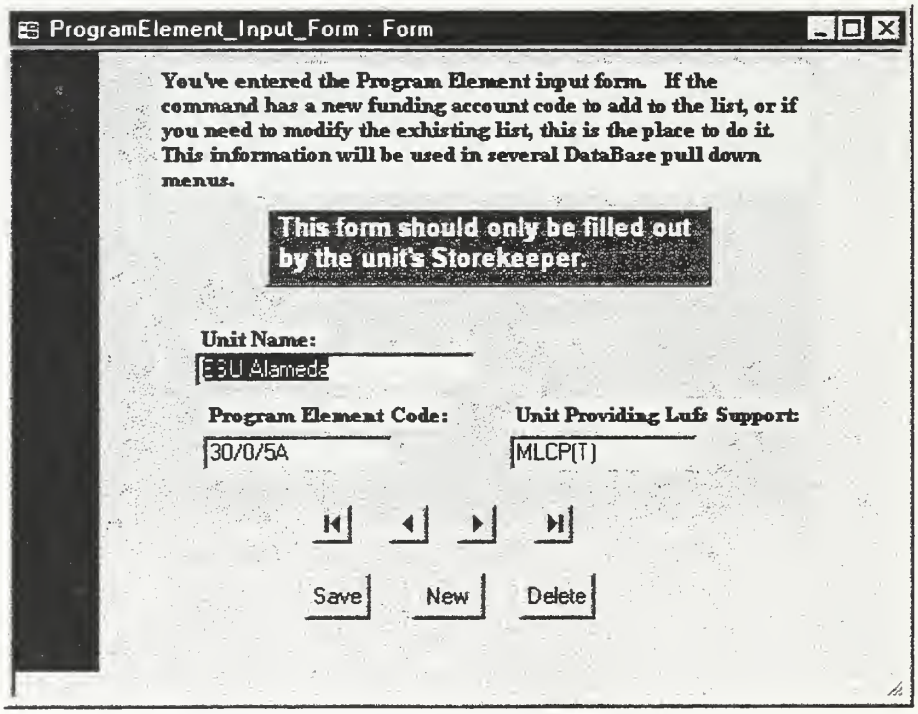


Figure D.4 - Program Element Input form

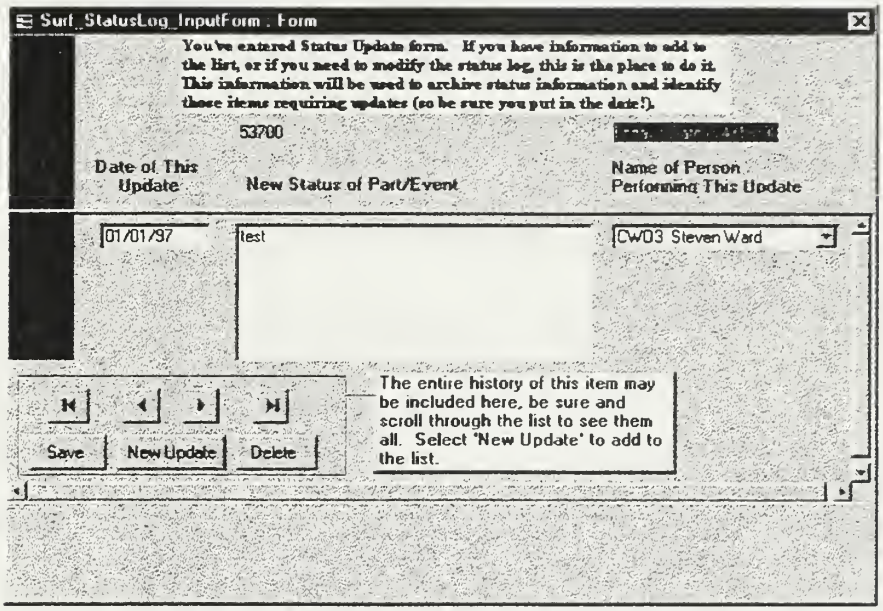


Figure D.5 SURF Status Log Input Form

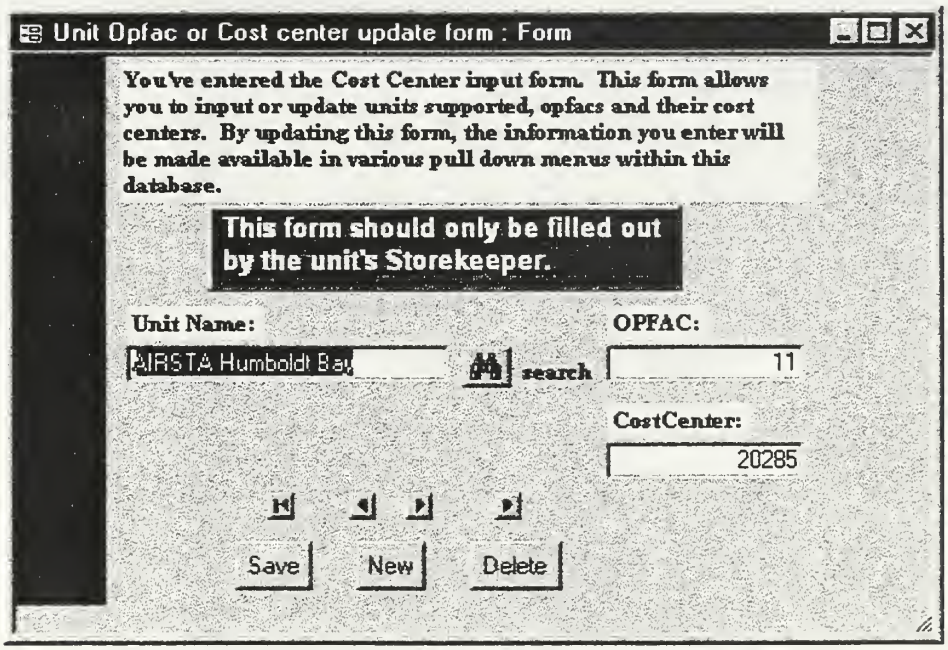


Figure D.6 - Unit Cost Center Update Form

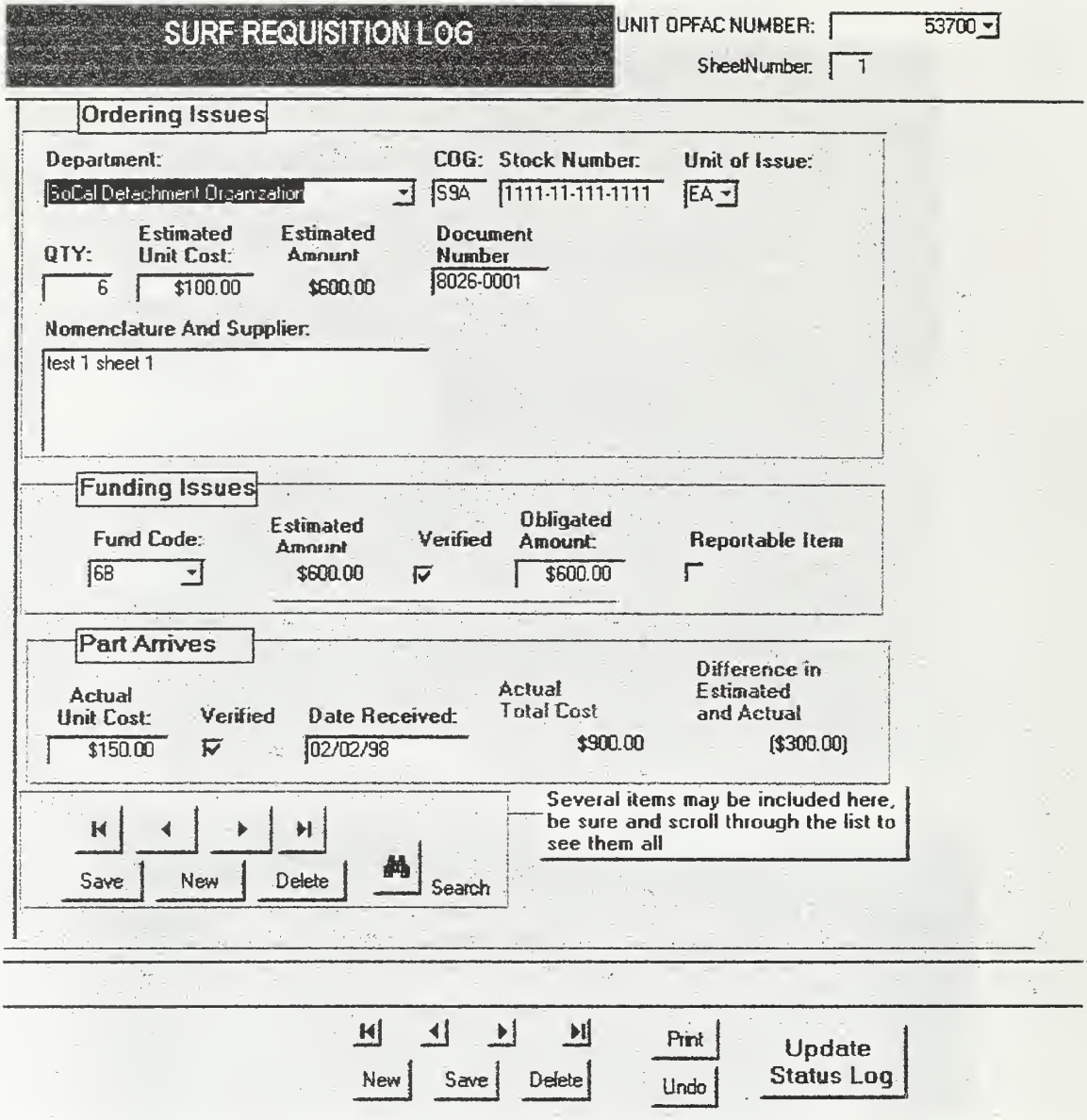


Figure D.7 - SURF Requisition Log Form

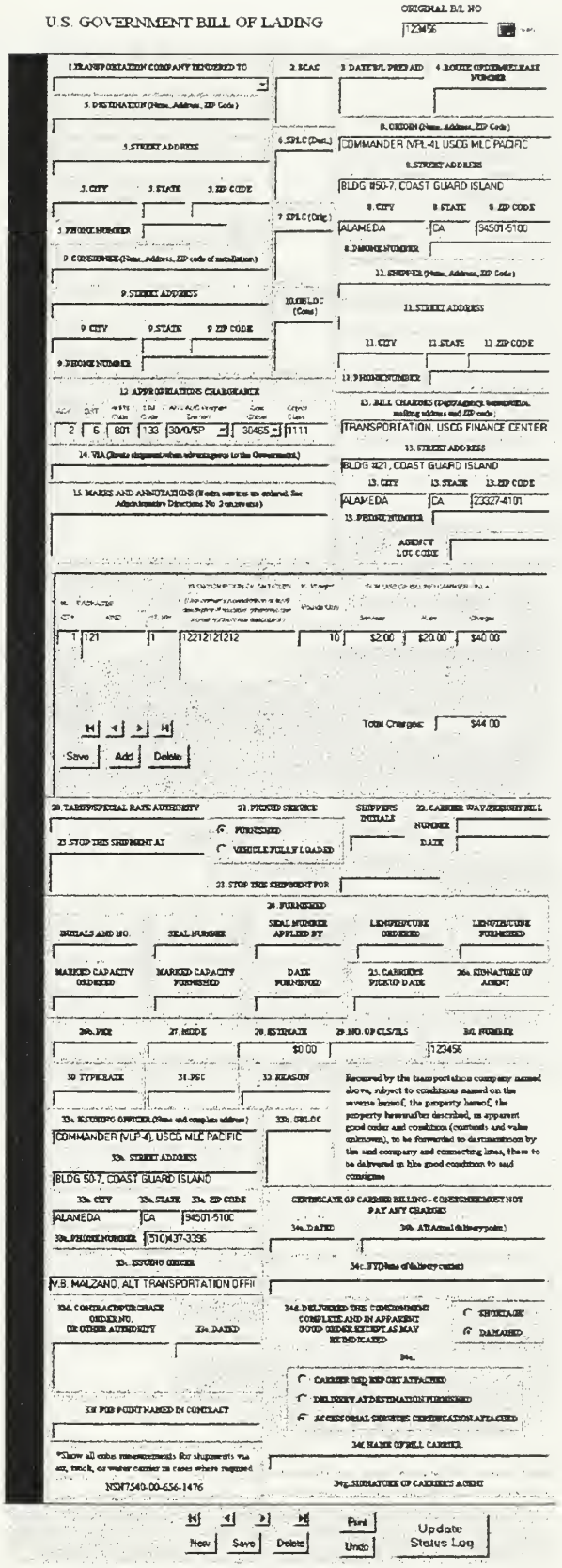


Figure D.8 - Bill Of Lading Form

APPENDIX E GLOSSARY OF TERMS

AOR (Area of Responsibility)

CASE Tools (Computer-Aided Software Engineering)

Software tools that provide automated support for some portion of the systems development process.

CASREP (Casualty Report)

This is a form that is submitted to U.S. Coast Guard Maintenance and Logistic units to request assistance in the repair of faulty equipment.

CGI (Common Gateway Interface)

A technology used to build dynamic WWW documents.

COTR (Contracting Officers Technical Representative)

COTS (Commercial Off The Shelf)

COTS is intended to reduce acquisition cycle time, provide access to state-of-the-art technology, increase competition, and provide lower costs to the purchaser.

DFD (Data Flow Diagram)

A graphical display that illustrates business processes and data interfaces from a data perspective.

ESU (Electronic Systems Support Unit)

A U.S. Coast Guard facility that maintains and supports all facets of Coast Guard electronic equipment.

ET (Electronics Technician)

An enlisted rating that is responsible for the repair and maintenance of sophisticated electronics equipment, radio receivers and transmitters, radar, navigation equipment, and computer equipment.

FDDI (Fiber Distributed Data Interface)

A LAN technology that uses fiber optics to connect computers on a ring technology (100Mbits/s).

FTP (File Transfer Protocol)

A protocol used to transfer a complete file from one computer to another.

Gopher

A software that provides a menu for accessing Internet resources.

GUI (Graphical User Interface)

A GUI replaces the keyboard commands typical of old-fashioned computers with point-and-click buttons and menus.

HTML (Hypertext Markup Language)

The code which is used to create and display information on the WWW.

HTTP (Hypertext Transfer Protocol)

The protocol used to transport a WWW page from one computer to another.

IRC (Internet Relay Chat)

Facilitates conversations over the Internet in close to real time.

LAN (Local Area Network)

A network of computers that transmits data along a single shared medium in a small geographical area (i.e. a single office building or college campus).

MAU (Media Access Unit)

It is a piece of equipment that adapts or formats a signal for transmittal over a communication medium. *(i.e.* an optical transmitter), which accepts an electrical signal at its input port and converts it to an optical signal accessible at its output port.

MIME (Multipurpose Internet Mail Extensions)

A mechanism that allows nontext data to be sent in a standard email message.

MLCLANT (Maintenance & Logistics Command Atlantic)

The Coast Guard Maintenance & Logistics Command Atlantic supports Atlantic Area operational readiness by ensuring that Coast Guard vessels and shore activities are fully capable of meeting their assigned missions. To accomplish this, MLCLANT provides a broad range of engineering, personnel, health and safety, financial management, and legal program support.

MLCPAC (Maintenance & Logistics Command Pacific)

The Coast Guard Maintenance & Logistics Command Pacific supports Pacific Area operational readiness by ensuring that Coast Guard vessels and shore activities are fully capable of meeting their assigned missions. To accomplish this, MLCPAC provides a broad range of engineering, personnel, health and safety, financial management, and legal program support.

SK (Storekeeper)

An enlisted rating responsible for providing and accounting for the constant stream of supplies, clothing, commissary items and spare.

TAD (Temporary Additional Duty)

TCP/IP (Transmission Control Protocol/Internet Protocol)

The collection of transport and application protocols used to communicate on the Internet and other networks.

Telnet

Allows a user to log on from a remote computer.

TT (Telephone Technician) An enlisted rating responsible for the installation and maintenance of many types of telecommunications equipment. The office that the technician is assigned to is often referred to as the TT shop.

URL (Uniform Resource Locator)

An address or location of a site to be viewed on the WWW.

WAN (Wide Area Network)

A network of computers that transmits data along a single shared medium in a large geographical area (i.e. can span multiple cities).

WWW (World Wide Web)

Computers which are linked and which provide hyperlinks to Internet resources worldwide.

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